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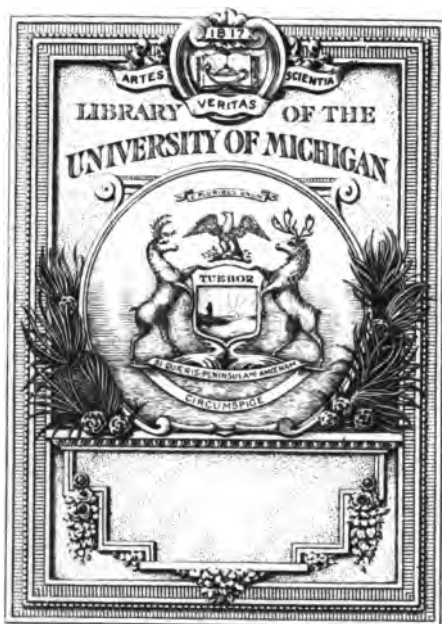
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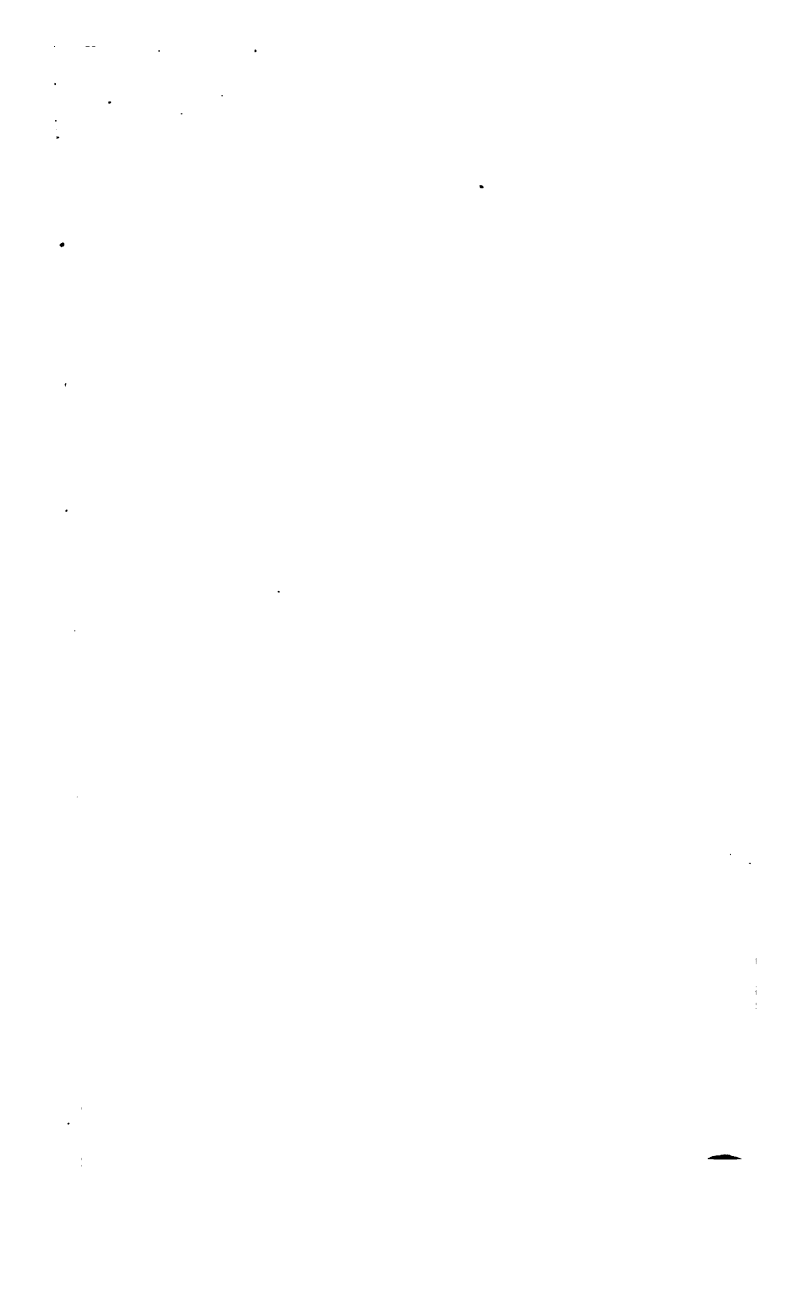
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THE
Gentleman's Diary,
OR THE
MATHEMATICAL REPOSITORY

An ALMANACK

For the YEAR of our LORD, 1757.

BEING

The First after BISSEXTILE, or LEAP-YEAR

Containing many useful and entertaining Particulars
peculiarly adapted to the ingenious Gentlemen en-
gaged in the delightful Study and Practice of the

MATHEMATICKS;

The Seventeenth *Almanack* published of this Kind;
and the Fifth of the NEW STYLE in *England*.

——— Quâ causâ argentea Phœbe
Passibus hæud æquis graditur; cur subdita nulli
Hactenus Astronomo numerorum fræna recusat:
Cur remeant Nodi, curque Auges progrediuntur.

——— Quantis refluxum vaga Cynthia pontum
Viribus impellit; dum fractis fluctibus ulvam
Deserit, ac Nautis suspectas nudat arenas,
Alternis vicibus suprema ad littora pulsans.

L O N D O N,

Printed for the Company of STATIONERS.
MDCCCLVII.



ADVERTISEMENT.

ALL Persons who are pleased to be CONTRIBUTORS to this DIARY; by answering the QUESTIONS, **ÆNIGMAS**, &c. or by sending us new ones, or other Subjects proper for the WORK; are desired to send them, and their Solutions, along with them, before the first Day of May 1757, directed for *The Authors of the GENTLEMAN'S DIARY*, to be left with Mr. JOSEPH HOW, at the *White Horse* at Cripplegate, LONDON; or, with Mr. THOMAS PEAT, in *Casslegate*, Nottingham (Post paid.)

To the PUBLICK.

HAVING always more Room in the Kalendar Part of our Diary than we can possibly fill up with good *Weather*; we expect that an exact Account of all the FAIRS in *England*, as fixed since the Regulation of the *Style*, will supply that Room better than *bad Weather*; and also be of more general Service to *Tradesmen, Dealers, &c.* according to the *Plan* in the KALENDAR this Year; and if this be agreeable, shall for the future publish them annually, according to the best Information we can procure from our Contributors in their respective Neighbourhoods, &c.

*Hist. of Science
Dome*

9-11-81

24597

Mr. Cha. Wildbore's Answer to Mr. Chr. Gooke's Question.

AT the Council held at *Nice*, in the Year of CHRIST 325, when the Calendar was settled for the observing *Easter*; the Vernal Equinox fell on the 20th of *March*: And in the Year 1582, Gregory XIII, Bishop of *Rome*, found it happened on the 10th of *March*; and that the Sun was departed Ten whole Days from his former Place in the Year; he therefore took those Ten Days out of the Calendar that Year, and ordered that the 10th of *March* should be reckoned as the 20th. And to prevent the Seasons from going backward as before, he ordained, that every hundredth Year, which in the *Julian* Form was to be a *Bissextile*, should be a *common* Year; but because that was too much, every fourth hundred Year was still to remain *Bissextile*: From which it is plain, that the *Gregorian* Year consists of 365 Days, 5 Hours, 49', 12", which is only 15" more than the true *Tropical* Year, and will not amount to one Day in less than 5760 Years.

But, though the Year is now fixed the same as at the *Nicene* Council; it is certain, that from the *Julian* Reformation to that Council, the Year had anticipated 2 Days, 20 h. 8', 30", and therefore we are so much later now in our Account, than at the *Julian* Reformation.

Nottingham,

Jan. 27, 1756.

JANUARY hath xxxi Days.

M D C De South

Full Moon the 5th
Last Quarter the 13th
New Moon the 20th
First Quarter the 27th

Day at { 45 m. past 11 Fore. Ap. T.
42 min. past 10 Morn.
7 min. past 2 Morn.
7 min. past 2 Morn.

1 23°
6 22 2
11 21 4
16 20 5
21 19 4
26 18 3

1 S	Circumcision, New Year's Day.	1 Sets	1 S. at.
2 B	2 Sunday after Christmas.	4 54	0
3 M	The Days are now increased, and	5 54	10 4
4 Tu	Nights shorten'd a quarter of an hour.	6 46	11 3
5 W	Old Christmas Day.	1 Rises	Morn.
6 Th	Epiph. CHRIST's * app. to Gentiles.	5 A 20	0 2
7 F	Days grow longer and longer every Day.	6 19	1 0
8 S	Lucian, Priest and Martyr.	7 21	1 56
9 B	1 Sunday after Epiphany.	8 24	2 41
10 M	Princess ELIZ. born. Plow-Monday.	9 31	3 26
11 Tu	Days are now 8 hours and 10 min. long	10 39	4 11
12 W	Old New Years Day.	11 49	4 55
13 Th	Hilary, Bish and Conf. <i>Preston, Lanc.</i>	Morn	5 42
14 F	A Fair at <i>Spotting</i> . for all sorts of Cattle.	1 2	6 32
15 S	<i>Barston, York shire.</i>	2 14	7 22
16 B	2 Sunday after Epiphany.	3 31	8 18
17 M	<i>Tavistock, Devonshire.</i>	4 47	9 17
18 Tu	Days increased above half an hour.	5 57	10 18
19 W	<i>Preston, Lancashire.</i>	6 57	11 21
20 Th	Oct. Hil. 1. Ret.	1 Sets	0 A 24
21 F	Agnes, Rom. V. and Mart. <i>Bristol.</i>	6 A 19	1 23
22 S	Aluc. Span. Deac. Mar. <i>Shefford, Bedf</i>	7 40	2 17
23 B	3 Sunday after Epiphany.	8 56	3 10
24 M	Term begins.	10 9	3 59
25 Tu	St. PAUL's Conversion.	11 19	4 46
26 W	Days are now 8 hours and 50 min. long	Morn.	5 31
27 Th	Quind Hil. 2. Ret.	0 27	6 17
28 F	Days increased one hour.	1 32	7 2
29 S	<i>Grampond, Cornwall.</i>	2 35	7 48
30 B	4 Sun. aft. Ep. K. CHARLES I. Martyr'd	3 36	8 35
31 M	at <i>White Hall</i> , 12 min. past 1, 1649	4 32	9 23

M D	⊙ Rises	⊙ Sets	☾ Sets	☾ Rises	♂ Rises	♀ Rises	♂ Rises	♀ Rises	Cl. Fat.
1	8h 4'	3 56'	6 A 19'	3 M 8'	7 M 53'	4 M 53'	8 M 5'	4	22'
6	8 0	4 0	6 0	2 51	7 46	5 4	8 Sets	6	38
11	7 54	4 5	5 41	2 33	7 38	5 15	4 A 10	8	43
16	7 50	4 10	5 23	2 16	7 31	5 25	4 38	10	32
21	7 43	4 17	5 6	1 59	7 23	5 33	5 7	12	3
26	7 36	4 25	4 48	1 40	7 14	5 49	5 38	13	15

FEBRUARY hath xxviii Days.

Full Moon the 4th	} Day at {	7 in the Morning.	1	160	58
Last Quarter the 11th		33 min. past 9 at Night.	6	15	28
New Moon the 18th		13 min. past 1 Afternoon.	11	13	52
First Quarter the 25th		3 quarters past 8 at Night.	16	12	10
			21	10	23
			26	8	32

M	W	Sundays, Holy and Remarkable Days,	D	Rises	Moon
D	D	Length, Incr. Days, Terms, Fairs, &c.			and Sets South
1	Tu	Day 9 hours and 10 minutes long.	5	M 21	10 A 11
2	W	Candlemas, or Purif. B. V. Mary.	6	6	10 58
3	Th	Cr. Pu. 3 Ret. Flint Bish. and Mar.	6	45	11 45
4	F	Gravefend, Kent. Plymouth, Dev. Bodm) Rises Morn.		
5	S	Agatha Sicil. V. and M. Ridbury, Kent	6	A 9	0 31
6	P	Septuagesima Sunday.	7	18	1 17
7	M	Days are now 9 hours and 28 minutes,	8	24	2 3
8	T	and Nights 14 hours 32 min. long.	9	32	2 49
9	W	Namptwich, Chesh. Stamford, Linc.	10	44	3 34
10	Th	Octab. Purif. 4 Ret.	11	57	4 22
11	F	Llandysfel, Monm. Day 4 h. 46m. long.	Morn. 5 12		
12	S	Term Ends.	1	11	6 5
13	B	Sexagesima Sunday. Old Candlemas.	2	24	7 C
14	M	Valentine, Bish. and M. Flint.	3	33	7 57
15	Tu	Days are now increased, and consequent-	4	37	8 58
16	W	ly Nights shortened 2 hours 20 min.	5	33	10 C
17	Th	Day 10 h. 6m. & Nights 13 h. 54 m. long	6	20	11 C
18	F	Nun-Eaton, Warwicksh.) Sets 11 58		
19	S	Beverley, Yorkshire.	6	A 26	0 A 52
20	B	Quinq. or Shrove Sunday:	7	43	1 44
21	M	Norton, Oxf.	8	57	2 34
22	Tu	Shrove Tuesday.	10	8	3 22
23	W	Ash Wednesday.	11	17	4 C
24	Th	St. MATTHIAS Ap. and M. Bath, Som.	Morn. 4 56		
25	F	Feverham, Kent. Caernarvon. Matlock.	0	23	5 43
26	S	Oundle, Northamptr.	1	26	6 31
27	B	Quadragesima Sunday, 1 Sun. in Lent.	2	25	7 18
28	M	Chesterfield. Derbyshire.	3	18	8 6

M	D	☉ Rises	☉ Sets	☿ Sets	♂ Rises	♂ Rises	♀ Rises	♀ Sets	Cl. fast
1	7h	26'	4h 35'	4 A 28	1 M 20	7 M 2	5 M 45	6 A 12	14' 14"
6	7	16	4 44	Rises	1 2 6	53	49	6 30	14 41
11	7	8	4 53	6 M 55	0 44	6 44	5 53	6 31	14 46
16	6	59	5 26	36 0	27 6	34 5	54	6 7	14 34
21	6	49	5 12	6 19	0 9 6	23 5	52	Rises	14 3
26	6	39	5 22	6 0	11 A 4	6 12	5 50	6 M 0	13 17

MARCH hath xxxi Days.

[M] [D] [C] Decl South

Full Moon the 6th
 Last Quarter the 13th
 New Moon the 20th
 First Quarter the 27th
 ☉ in Aries 19 Days, 21 H. 44 Minutes.

1 7^o 24
 6 5 2
 11 3 3
 16 1 3
 21 0 N. 2
 26 2 2

1	Tu	David Archb. Minerv. Galgath, Breck.	4	M	5	8	A	54
2	W	Ember Week. Cedde, or Chad. B. Litc.	4	46		9		42
3	Th	Days are now above 11 hours long	5	21	10			31
4	F	Melton Mowbray, Leic. Darlington, Dur.	5	52	11			17
5	S	Blandford, Dorsetshire.	6	19		Morn.		
6	B	Reminiscere, 2 Sunday in Lent.						
7	M	Stottingham Fair, for all sorts of Cattle.	7	A	28	0		49
8	Tu	Days are now increased 3 hours 38 m.	8	39	1			36
9	W	being now 11 hours & 23 min. long.	9	52	2			24
10	Th	And now are increasing apace daily, and	11	6	3			14
11	F	the Nights shorten every Night as fast.				Morn.		
12	S	Greg. M. B. of R. & C. Culliford, Dev.	0	18	5			0
13	B	Octil, 3 Sunday in Lent.	1	29	5			55
14	M	Brimblebanks, Norf. Sevenoak, Kent.	2	35	6			55
15	Tu	Oakham, Rut. Oswestry, Shropsh. Langa	3	32	7			54
16	W	Pensance, Cornw. [dock.	4	19	8			52
17	Th	Hariff, Hunt. Malmesbury, Wilts.	5	0	9			50
18	F	Ed. K. o' W. Sox. Loughbro' Leic. Workop.	5	34	10			44
19	S	Abbot's Bromley, Staff. Rushin, Denb.	6	3	11			38
20	B	Lazare, 4 S. in Lent. Midlent Sunday.						
21	M	Downes, Devon.	7	A	53	1		18
22	Tu	Day 12 hours and near a quarter long.	9	5	2			7
23	W	Wrexham, Den. Wye, K. Wooburn, Bed.	10	13	2			54
24	Th	Llanerchemith. Caer. Shirley St. Warw.	11	20	3			42
25	F	Annunc. Lady Day. Pr. Edward born.				Morn.		
26	S	Gloucester. Nantwich, Chesh. St. Albans	0	22	5			10
27	B	Judica, 5 Sunday in Lent.	1	17	6			7
28	M	Cobham, Surrey, Preston, Lancashire.	2	7	6			56
29	Tu	Stourbridge, Worcestershire.	2	53	7			43
30	W	Days are increased above 5 h. Drayton	3	29	8			30
31	Th	Midhurst, Suff. Northmore, Suff. Durham.	4	1	9			18

M D	☉ Rises	☉ Sets	☾ Rises	☾ Sets	♂ Rises	♀ Rises	♂ Rises	♀ Rises	Cl. fast
1	6 ^h 34	5 ^h 27	5 M 50	11 A 31	6 M 6	5 M 47	5 M 18	12 42	
6	6 24	5 37	5 33	11 17	5 56	5 44	5 34	11 35	
11	6 14	5 47	5 16	10 58	5 44	5 38	5 25	10 16	
16	6 4	5 57	4 59	10 38	5 34	5 33	5 19	8 50	
21	5 54	6 7	4 42	10 19	5 23	5 27	5 14	7 20	
26	5 44	6 17	4 25	10 0	5 11	5 19	5 10	5 47	

APRIL hath xxx Days.

M D ☉ Decl. North.

Full Moon the 4th
Last Quarter the 11th
New Moon the 18th
First Quarter the 26th

Day at { 18 min. past 2 Afternoon.
a quarter past Noon.
56 min. past Noon.
54 m. past 11 Forenoon.

1	40	45
6	6	37
11	8	29
16	10	17
21	12	1
26	14	20

2	F	All Fools Day. Coventry, Warwickshire.	4	M	29	10	A	4
3	S	Salisbury, Wilts. Chichester, Suff. Tocester.	4		56	10		51
	B	Palm Sunday. 6 Sunday in Lent.	5		20	11		38
4	M	Northfleet, Kent. Perthathwy, Anglesea.	5	Rises			Morn.	
5	Tu	Old Lady D. Huntington. Doncaster.	7	A	46	0		26
6	W	Epping, Essex. Rochford, Essex.	9		1	1		17
7	Th	Spotting. for all sorts of Cattle lasts 8 Days	10		18	2		8
8	F	Good Friday. Days 13 h. 24 m. long.	11		31	3		3
9	S	Days increased 5 hours & above an half		Morn.		4		0
10	B	EASTER DAY. Our SAVIOUR's Res.	0		38	4		58
11	M	Easter Monday. Newport-Pagnel, Bucks.	1		37	5		56
12	Tu	Easter Tuesday. St. Toffels, Cornwall.	2		27	6		54
13	W	Budworth, Chesh. Ashbourn, Derb. Orleton.	3		8	7		51
14	Th	Now the Days encrease very fast.	3		43	8		46
15	F	Bewley, Hampshire. Derby.	4		13	9		38
16	S	Dilton's Marsh, Wilts. Binbrooke, Linc.	4		40	10		28
17	B	Low Sunday. 1 Sunday after Easter.	5		4	11		17
18	M	Cobham, Surry. Derby.		Sets		0	A	6
19	Tu	Castle town, Dorsetsh. Winslow, Bucks.	8	A	4	0		53
20	W	Worcester. Cank, Staff. Norfe, Devonsh.	9		12	1		42
21	Th	Modbury, Devonsh. Rumney, Kent.	10		16	2		30
22	F	Shrewsbury. Gifborough, Yorksh.	11		15	3		19
23	S	St. GEORGE. Bisley, Glo. Northampton		Morn.		4		8
24	B	2 Sunday after Easter.	0		9	4		56
25	M	St. MARK Ev. & M. Quind. Pasch. 1 Ret	0		55	5		43
26	Tu	Prince WILLIAM born.	1		34	6		30
27	W	Term begins. Boroughbridge, Yorksh.	2		8	7		16
28	Th	Sobam, Cambr. Aberforth, Yorksh.	2		37	8		2
29	F	Market Harbro' Leic. Newchurch, Lanc.	3		4	8		48
30	S	Gifborough, Yorksh.	3		29	9		34

N.B. Winter never rots in the Sky. R. Cooper.

M	D	☉ Rises	☉ Sets	☽ Rises	☉ Rises	☽ Rises	☉ Rises	☽ Rises	☉ Rises	☽ Rises	Cl. fast.
1	5	33	6 28	4 M 5	9 A 36	4 M 57	5 M 11	5 M 53			55
6	5	23	6 38	3 47	9 16	4 45	5 34	59 2			24
11	5	13	6 48	3 29	8 54	4 33	4 55	54 0			58
16	5	4	6 57	3 12	8 32	4 22	4 47	49	Slow	10	
21	4	54	7 7	2 55	8 11	4 10	4 39	43 1			28
26	4	7	7 16	2 37	7 4	4 57	4 30	39 2			25

M A Y hath xxxi Days.

[M] ☉ Decl
D North.

Full Moon the 4th
Last Quarter the 10th
New Moon the 18th
First Quarter the 26th

} Day at { 6 min. past 1 Morning.
9 min. past 6 Afternoon.
50 min. past 1 Morning.
a quarter after 5 Morn.

15° 13'
16 40
18 0
19 12
20 17
21 13

1	B	3 S. aft. Easter. St. Ph. & J. A. C. A. D. & M.	3	M	51	10	A	22
2	M	Tres Pasch. 2 Ret. Totnes. [Wirksworth]	4		16	11		12
3	Tu	Invent. of the Cross. Lancaster, Brecknock	4		42		Morn.	
4	W	Ipswich Suff. Chesterfield, Derb. Bewdley.	D	Rises	0			3
5	Th	Boston, Linc. Monmouth. Stockunderham.	9	A	23	0		59
6	F	St. John Evang. ante Port Lat. Abingdon.	10		33	1		55
7	S	Bath, Som. Dunmow, Eff. Leek, Staff.	11		38	2		55
8	B	4 Sunday after Easter		Morn.	3			55
9	M	Mens. Pasch. 3 Ret. Bosworth, Leic.	0		33	4		55
10	Tu	Higham. Ferrers, Northamp. Lutterworth	1		17	5		53
11	W	Leicester. Dunstable, Bedf. Crediton, Dev.	1		52	6		47
12	Th	Old May Day. Belper, Der. Penryn, Corn.	2		22	7		39
13	F	Tiddefwel, Derb. Crouch, Eff. Bala, Meri.	2		49	8		28
14	S	Wells, Som. Denbigh. Newark, Notting.	3		13	9		17
15	B	5 Sunday after East. Rogat. Sunday.	3		37	10		3
16	M	Quind. Pasch, 4 Ret. Caerwilly. Caerm.	4		0	10		51
17	Tu	Ashford, Kent. Holbeach, Linc. Wareham.	4		26	11		37
18	W	Rogation Week. Hatesbury. Thunderly.	D	Sets	0	A	25	
19	Th	Holy Thursday, CHRIST'S Ascension.	9	A	8	1		14
20	F	Craft. Ascen. 5 Ret. Galgarth. Wickham.	10		3	2		3
21	S	Ashborn, Derb. Cromstock, Devon.	10		53	2		52
22	B	Exaudi. 6 Sunday after Easter.	11		36	3		40
23	M	Term ends. Dorchester, Bala, Merion.		Morn.	4			26
24	Tu	P. FREDERICK WILLIAM born Bath.	0		11	5		12
25	W	Abberford, Dagenham, Eff. Malmesbury.	0		42	5		58
26	Th	Aug. 1st Archb. Cant. Perthathwy, Angl.	1		9	6		43
27	F	Venerable Bede, Pr. Stortford, Hertford.	1		33	7		27
28	S	Bala, Merioneth. Hadstock, Devonsh.	1		55	8		13
29	B	Whit. Sund. K. CHAR. II. Nat. and Ret	2		18	9		1
30	M	Whit. Monday. Southwell, Nott.	2		41	9		51
31	Tu	Whit. Tuesday. Newark upon Trent.	3		8	10		43

M	D	☉ Rises	☉ Sets	☿ Rises	♂ Sets	♂ Rises	♀ Sets	♀ Rises	♂ Sets	Cl. flow.
1	4 ^h	36	7 23	2 M 19	7 A 26	3 M 45	4 A 22	4 M 35		3' 10"
6	4	28	7 33	2 1	Sets	3 32	4 14	Sets		3 43
11	4	20	7 41	1 42	4 M 20	3 19	4 7	8 A 59		3 59
16	4	12	7 48	1 23	4 03	3 64	1 9	35		4 2
21	4	5	7 55	1 33	38	2 53	3 55	10 0		3 50
26	3	59	8 1	0 43	3 16	12 39	3 50	10 50		3 25

JUNE hath xxx Days.

Decl. North

Full Moon the 2d
Last Quarter the 9th
New Moon the 16th
First Quarter the 24th

Day at { half past 9 in the Morn.
half before 1 Morning.
40 min. past 3 Afternoon.
39 min. past 7 at Night

☉ in Cancer 20 Day, 20 h. 44 minutes.

1	22°	8'
6	22	43
11	23	10
16	23	24
21	23	29
26	23	24

1	W	Ember Week. <i>Lenton</i> , Nott. <i>Ruthin</i> , D.	3 M 38	11 A 30
2	Th	<i>Bingham</i> , Nott. <i>Daventry</i> , Northamp.	☾ Rises	Morn.
3	F	<i>Harsley-Green</i> , Lanc. <i>Kerby-Steph</i> West.	9 A 24	0 39
4	S	Pr. of WALES bo. 1738. <i>St. Tossels</i> , Cor.	10 24	1 42
5	B	Trinity Sunday.	11 14	2 43
6	M	Craft. Trin. 1 Ret. <i>Lenham</i> , Kent.	11 54	3 43
7	Tu	<i>Montgomery</i> . <i>Stow in Guillam</i> , Suff.	Morn.	4 40
8	W	<i>St. Germans</i> , Cornwall.	0 26	5 34
9	Th	<i>Haddersfield</i> , Suffex. <i>Corpus Christi</i> .	0 53	6 24
10	F	Term begins. <i>Prs. AMELIA</i> bo. 1711.	1 16	7 12
11	S	<i>St. Barnabas</i> Ap. & M.	1 40	8 0
12	B	1 Sunday after Trinity.	2 3	8 46
13	M	Oct. Trin. 2 Ret. <i>Kedderminster</i> , Wor.	2 27	9 31
14	Tu	<i>Bangor</i> , Cornwall.	2 54	10 18
15	W	<i>Bytton</i> , Somersetshire.	3 23	11 5
16	Th	<i>Wrexham</i> , Denb. <i>Milborn Port</i> , Som.	☾ Sets	11 53
17	F	<i>S. Alban</i> , Bedf. <i>Taunton</i> . So <i>Bradford</i> , W.	8 A 45	0 A 42
18	S	<i>Ingleton</i> , Yorksh. <i>Wiggan</i> , Lanc.	9 30	1 30
19	B	2 Sunday after Trinity.	10 8	2 18
20	M	Quind Trin. 3 Ret. <i>Derby</i> , Hereford.	10 40	3 4
21	Tu	<i>Highbeach</i> , Eff. <i>Newborough</i> , Lanc.	11 8	3 49
22	W	K. GEO. II. Inaug. <i>Boroughbridge</i> , Yo.	11 32	4 34
23	Th	<i>Armington</i> , Dev. <i>Folkingham</i> , Linc. Fast.	11 54	5 17
24	F	Nativ. of <i>St. John</i> Bap. <i>Barnwell</i> , Cam.	Morn.	6 1
25	S	Days will now grow shorter every Day.	0 16	6 46
26	B	3 S. after Trinity. K. GEORGE II. Pro	0 40	7 33
27	M	Tres Trin. 4 Ret.	1 2	8 22
28	Tu	<i>Emlin</i> , Worc. <i>Fairford</i> , Gloucest. Fast.	1 30	9 16
29	W	<i>St. Peter</i> Ap. & M. Term ends.	2 2	10 13
30	Th	<i>Bridgenorth</i> , Shropshire.	2 43	11 14

M D	☉ Rises	☉ Sets	☿ Rises	☿ Sets	♂ Rises	♀ Rises	♂ Sets	Cl. flow
1	3 ^h 53	8 ^h 7	0 M 19	2 M 51	2 M 23	3 46	10 A 11	2' 41
6	3 49	8 11	11 A 54	2 29	2 9	3 45	9 59	1 52
11	3 46	8 14	11 33	2 8	1 56	Sets	9 37	0 55
16	3 44	8 16	11 12	1 46	1 43	8 A 30	9 8	Fast. 7
21	3 41	8 17	10 52	1 24	1 30	8 36	8 35	1 10
26	3 44	8 16	10 31	1 4	1 18	8 41	7 5	2 10

JULY hath xxxi Days.

M ☉ Decl.
D North.

Full Moon the 1st	} Day at {	37 min. past 4 Afternoon	1 23° 8'
Last Quarter the 8th		half past 8 Morn.	6 22 42
New Moon the 16th		37 min. past 6 Morning.	11 22 7
First Quarter the 24th		10 min. past 7 Morning.	16 21 30
Full Moon the 30th		36 min. after 11 at Night	21 20 27
			26 19 25

1 F	Workop, Nott. Hith, K. Thornby Ab. Ely	3 M 34	Morn.
2 S	Visit of the B. V. M. Hereford Brecknock	D Rises	0 17
3 B	4 Sunday after Trinity.	9 A 44	1 21
4 M	Lancaster. Chesterfield, Der. Turrington D	10 20	2 22
5 Tu	Old Midf. Day. Ashborne. Der. h. Leicester.	10 50	3 10
6 W	Pearn, Cornw. Lancaster Liverpool.	11 16	4 13
7 Th	Tho. a Becket. Chipping-Norton, Ox	11 41	5 4
8 F	Folkestone, Kent. Machynleth, Montg.	Morn.	5 53
9 S	Bromley, Devonsh.	0 4	6 39
10 B	5 Sunday after Trinity.	0 27	7 24
11 M	Peterborough, Northamptonshire.	0 53	8 11
12 Tu	Canterbury, Kent. Carshalton, Surry.	1 21	8 57
13 W	Congleton, Chesh. Huntingdon.	1 55	9 45
14 Th	Days shorten every Day.	2 33	10 34
15 F	Stithun, B. of Winchest.	3 21	11 21
16 S	Mitlock, Derb. Winchester. Polstead, Suff	3 Sets	0 A 0
17 B	6 Sunday after Trinity.	8 A 39	0 56
18 M	Days are now 16 h. Nights 8 h. long.	9 7	1 42
19 Tu	Kenninghall, Norfolk.	9 33	2 27
20 W	Warg. V. & M. Helfstone, Cornwall.	9 57	3 11
21 Th	Fotheringhay (W. Smith) Alfreton, Derb.	10 19	3 50
22 F	S. Mary Magdalen? Pres. CAR. MAT	10 41	4 30
23 S	Honiton, Devon. Daventry. 1 [born	11 2	5 20
24 B	7 Sunday after Trinity.	11 27	6 11
25 M	St. JAMES Ap. & M.	11 56	7 1
26 Tu	Bristol. Bedwin. Derby. Tamworth.	Morn.	7 50
27 W	Headon, Yorksh. Portdown, Hants.	0 31	8 54
28 Th	Emlin, Worcest. Fairford, Gloucest.	1 16	9 51
29 F	Days are now but 15 hours and half long	2 11	10 51
30 S	Gaerleon, Monm. Linton, Camb.	D Rises	12 0
31 B	8 Sunday after Trinity. Dog Days beg	8 A 13	Morn.

M D	☉ Rises	☉ Sets	☿ Rises	☿ Sets	♂ Rise	♀ Sets	♂ Rises	Cl. fast.
1	3 ^h 46'	8 14	10 A 9	0 M 43	1 M 6	8 A 44	3 M 51	3 15
6	3 49	8 11	9 49	0 23	0 55	8 45	3 23	4 9
11	3 53	8 7	9 27	0 2	0 43	8 44	2 57	4 54
16	3 58	8 2	9 7	11 A 37	0 33	8 41	2 39	5 28
21	4 4	7 56	8 47	11 17	0 23	8 38	2 32	5 50
26	4 11	7 49	8 25	10 58	0 14	8 23	2 35	5 57

SEPTEMBER hath xxx Days.

M ☉ Dec
North

Last Quarter the 5th
New Moon the 13th
First Quarter the 20th
Full Moon the 27th

Day at { 27 min. past 9^h morn.
58 min. after 1 Aftern.
59 min. past 1 at Night.
46 min. past 4 Aftern.

☉ in Libra 22 Day, 10 h. 15 min.

11
20
26
31
34
23

1	Th	Giles, Abbot & Conf. North-moor, W. at	8 A	37	2 M	2
2	F	Richmond Road, North.	9	3	3	1
3	S	Brecknock, and five following Days.	9	30	4	
4	B	13 Sunday after Trinity.	10	2	4	5
5	M	Days are now decreased 3 h. 18 min.	10	37	5	4
6	Tu	Folkingham, Linc. Snaith, Yorksh.	11	19	6	3
7	W	Enurhus, B. of Orleans.	Morn.		7	2
8	Th	Nativ. of the B. V. M. Wirksworth, Derb.	0	8	8	1
9	F	Dog Days end. Bishops-Castle, Shropsh.	1	0	8	5
10	S	Days 12 hours 56 min. long.	1	59	9	4
11	B	14 Sunday after Trinity.	3	0	10	3
12	M	Days decreased 3 hours and 3 quarters.	4	5	11	1
13	Tu	Newton, Lanc. Tregon, Cornw.	5	Sets	0	A
14	W	Holy Cross. Barsly. K. Woburn, Bedf.	7 A	2	0	4
15	Th	Days 12 hours 36 minutes long.	7	24	1	3
16	F	Lutterworth, Leic. Newcastle, Staff.	7	47	2	1
17	S	Lambert, Bish. & M. Frobus, Cornw.	8	13	3	
18	B	15 Sunday after Trinity.	8	43	3	5
19	M	Drayton, Shropshire. Rich. Abbot.	9	19	4	4
20	Tu	Gisbrough, York. Manchester, Lanc.	10	3	5	4
21	W	Ember Week. St. MATT. Ap. & Ev.	10	58	6	4
22	Th	Allchurch, Worcest.	Morn.		7	4
23	F	Halkin, Wilts. Paincastle, Radnor.	0	3	8	4
24	S	Ledwyn, Glam. Wickware, Glouc.	1	17	9	4
25	B	16 Sunday after Trinity.	2	30	10	3
26	M	Bakewell and Chesterfield, Derb.	3	57	11	2
27	Tu	Clapham, Yorksh. Northall, Middlesex.	5	Rises	Morn	
28	W	Gloucester. Tuxford, Nottinghamsh.	6 A	45	0	2
29	Th	St. MICHAEL and all Angels.	7	11	1	1
30	F	S Jer. Pr Conf. & Doct. Wrexham, Denb.	7	38	2	

M.D.	☉ Rises	☉ Sets	☿ Sets	♂ Sets	♀ Sets	☿ Rises	♂ Rises
1	5 ^h 11	6 ^h 43	3 M 12	8 A 46	11 A 27	7 A 3	7 A 16
6	5 23	6 36	2 53	8 30	11 23	7 23	7 7
11	5 31	6 26	2 32	8 13	11 19	7 13	6 58
16	5 43	6 16	2 13	7 58	11 16	7 5	6 47
21	5 53	6 6	1 53	7 42	11 13	6 56	6 37
26	6 2	5 56	1 24	7 25	11 10	6 40	6 20

OCTOBER hath xxxi Days.

M D Decl.
D South

1st Quarter the 5th
New Moon the 13th
1st Quarter 20th
Full Moon the 27th

} Day at { 22 min. past 3 Morn.
41 min. past 4 Morn.
9 min. past 7 Morn.
17 min. past 4 Morn.

1 30 20'
6 5 17
11 7 11
16 9 3
21 10 52
26 12 37

1 S	Remig. B. of Rhemes. <i>Sheffnal</i> , Shrop.	8 A	8	2 M	55
2 B	17 Sunday after Trinity. [&c. 8 Days	8	42	3	45
3 M	Nottingham , for <i>Cattle, Cheese, Hops</i> ,	9	22	4	34
4 Tu	<i>Penkridge</i> , Staffordshire.	10	8	5	24
5 W	<i>Abberford. Lampore. Som. Llanvilling.</i>	10	59	6	13
6 Th	<i>Faith, Virgin and Mart. Hull. Yorksh.</i>	11	57	7	1
7 F	<i>Billericay, Essex. Countess Court, Wilts.</i>	Morn.	7	49	
8 S	<i>Abingdon, Berks. Challock, Kent.</i>	0	57	8	36
9 B	18 Sunday after Trinity.	2	1	9	21
10 M	Old Mich. D. St. <i>Albans, Bedal, Leicester.</i>	3	6	10	5
11 Tu	Days are now 10 hours 54 min. long.	4	15	10	51
12 W	<i>Barbury, Oxf. Castor, Linc. Se'noaks, K.</i>	5	24	11	36
13 Th	Transl. of K. Ed. Conf. <i>Devizes, Wilts.</i>	D	Sets	0	A 22
14 F	<i>Buttensmoor, Shrop. Workop, Notting.</i>	6 A	24	1	10
15 S	<i>Falfez, Warwickshire.</i>	6	51	2	0
16 B	19 Sunday after Trinity.	7	26	2	52
17 M	<i>Bosworth, Leic. Hay, Brecknocksh.</i>	8	9	3	48
18 Tu	St. Luke the Evang. <i>Cank, Staff.</i>	9	0	4	46
19 W	<i>Abberford. Yarm, Yorksh. Oxford.</i>	10	0	5	45
20 Th	<i>Albourn, Derb. Blythe, Nott. Hereford.</i>	11	10	6	42
21 F	<i>Gainborough, Linc. Downes, Cornw.</i>	Morn.	7	40	
22 S	K. GEO. II. crowned 1727 <i>Wells, Som.</i>	0	26	8	35
23 B	20 Sunday after Trinity.	1	45	9	28
24 M	<i>Drayton. Shropshire. (Rich. Abbot.)</i>	3	6	10	18
25 Tu	Crispin Mart. <i>Queens Camel, Som.</i>	4	23	11	9
26 W	<i>Grantham, Linc. Chepstow, Monm.</i>	5	38	11	59
27 Th	<i>Appletreewick, Yorksh.</i> Fast	D	Rises	Morn.	
28 F	St. SIMON & JUDE , A. & M. <i>Buckingh.</i>	6 A	10	0	49
29 S	<i>Newcastle upon Tyne,</i>	6	42	1	39
30 B	21 Sunday after Trinity. [age, &c.	7	20	2	29
31 M	<i>Belper, Derb. with neither Toll, Pack-</i>	8	3	3	18

I D	⊙ Rises	⊙ Sets	1/2 Sets	1/4 Sets	♂ Rises	♀ Sets	♀ Sets	Cl. flow.
1	6h 12'	5h 47'	1 M 10	7 A 9	11 A 6	6 A 41	6 A 12	10' 30"
6	6 22	5 37	0 57	6 53	11 3	6 34	5 57	12 0
11	6 32	5 27	0 38	6 38	10 59	6 29	5 42	13 20
16	6 42	5 17	0 18	6 21	10 54	6 24	5 22	14 28
21	6 51	5 8	11 A 5	6 5	10 49	6 2	Rises	15 21
26	7 1	4 58	11 37	5 49	10 43	6 1	5 Mic	15 56

NOVEMBER hath xxx Days.

M ☉ Des
D South

Last Quarter the 3d	} Day at {	53 min. past 11 at Night.	1 14° 36
New Moon the 11th		10 after 6 at Night.	6 16 5
First Quarter the 18th		33 after 2 Afternoon.	11 17 36
Full Moon the 25th		25 past 6 at Night.	16 18 53
			21 20 4
			26 21 4

1 Tu	All Saints Day.	8 A 52. 4 M
2 W	Princess of Orange bo. 1709. All Soul.	9 47 4 5
3 Th	On the Morrow of all Souls. 1 Ret.	10 47 5 4
4 F	Appleshaw, Hants.	11 50 6 3
5 S	Papists Conspiracy. Beverley, York.	Morn. 7 20
6 B	22 Sunday after Trinity. [Term beg.	0 54 8
7 M	Prince HENRY FRED. born 1745.	1 59 8 4
8 Tu	Hexham, Northum. Colchester, Hertford.	3 7 9 3
9 W	Bingham, Not. (now returned to the O.S.)	4 17 10 1
10 Th	K. GEO. II. bo. 1683 Darlington, Durh.	5 29 11
11 F	St. Martin, Bish. & Conf. Liverpool.	D Sets 11 5
12 S	On the Morrow of Saint Martin. 2 Ret.	5 A 26 0 A 4
13 B	23 Sunday after Trinity.	6 5 1 4
14 M	Brecknock, and five Days following.	6 53 2 4
15 Tu	Machutus, Bish.	7 52 3 3
16 W	Andover, Hampsh. Launceston, Cornw.	9 1 4 3
17 Th	Hugh, Bish. of Linc. Sheffield, Yorksh.	10 14 5 3
18 F	In eight Days of Saint Martin. 3 Ret.	11 30 6 2
19 S	Woodcot, Oxf. Yarme, Yorksh.	Morn. 7 22
20 B	24 Sunday after Trinity.	0 47 8 12
21 M	Garflang, L. Lamport, Som. Lodden, Norf.	2 5 9 2
22 Tu	Darlington, Dur. Dover. Monmouth, York.	3 20 9 5
23 W	S. Clem. 1. B. of R. Hide, Essex.	4 34 10 3
24 Th	Day 8 hours 28 min. long.	5 47 11 2
25 F	Prince WILL. HENRY bo. 1734 Ret.	D Rises Morn.
26 S	Chesterfield, Derb. the 25th	5 A 10 0 16
27 B	Advent Sunday.	5 50 1 5
28 M	Gloucester. Lincoln. Northampton.	6 37 1 55
29 Tu	Term ends. Ashbourn, Derb.	7 30 2 44
30 W	Her Royal High. the Prs. of WALES bo.	8 27 3 33

[1719.

M D	☉ Rises	☉ Sets	☿ Sets	♂ Rises	♀ Sets	♀ Rises	Cl. flow.
1	7 ^h 12	4 ^h 47	11 A 15	5 A 29	10 A 35	6 A 18	5 M 29 16' 14
6	7 21	4 38	10 50	5 12	10 26	5 19	5 24 16 7
11	7 29	4 30	10 37	4 55	10 18	6 23	5 36 15 40
16	7 37	4 22	10 18	4 38	10 8	6 30	5 57 14 42
21	7 45	4 15	9 58	Rises	9 57	5 36	6 20 13 42
26	7 51	4 9	9 38	7 M 27	9 44	5 44	6 45 12 13

DECEMBER hath xxxi Days.

M ☉ Decl.
D South.

Left Quarter the 3d }
New Moon the 11th } Day at { 6 min. past 9 at Night.
First Quarter the 17th } { 27 after 6 in the M rn.
Full Moon the 25th } { 7 min. past 11 at Night.
21 min. past 11 Forenoon.

☉ in Capricorn 21 Day 1 hour, 48 minutes.

1	21°	55'
6	22	36
11	23	5
16	23	23
21	23	29
26	23	22

1	Th	Dutton, Dev. Heath, Su. Ketterham, Yor.	9	A	28	4	M	20
2	F	Hoxne, Suffolk.	10	30	5	7		
3	S	Pennyfont, Somersetshire.	11	35	5	51		
4	B	2 Sunday in Advent.		Morn.	6	33		
5	M	Colford, Glouc.	0	41	7	16		
6	Tu	Nicol. B. Launceston, Corn. Ludlow, Shr.	1	48	8	c		
7	W	Days decreased 8 hours 34 min.	2	57	8	45		
8	Th	Wells, Som. Bolton, Linc. Malpas, Ch.	4	11	9	32		
9	F	Bradford, Wilts.	5	24	10	23		
10	S	Newport, Shropsh. Swindon, Wilts.	6	39	11	17		
11	B	3 Sunday in Advent.		D Sets	0	A 15		
12	M	Shrewsbury, Shrop. Ross, Her. Bedal, Yo.	5	A 27	1	16		
13	Tu	Lucy, Virgin & Mart. Amesbury, J. D.	6	35	2	18		
14	W	Ember Week.	7	49	3	17		
15	Th	Atherstone, Warw. Nampwich, Chesh.	9	6	4	14		
16	F	O Sapientia.	10	26	5	9		
17	S	Exeter, Devon. Grantham, Linc.	11	43	6	c		
18	B	4 Sunday in Advent.		Morn.	6	49		
19	M	The shortest Day at LOND. is 7 h. 35 m.	0	57	7	35		
20	Tu	at NOTTINGH. 7 hours 18 min.	2	11	8	23		
21	W	St. THOMAS Ap. & M.	3	22	9	10		
22	Th	Newport Keams, Montg.	4	33	9	58		
23	F	Greatest dec. of Day at LOND. 8 h. 50 m.	5	41	10	46		
24	S	at NOTT. 9 hours 25 min.	6	45	11	37		
25	B	CHRISTMAS-DAY.		D Rises	Morn.			
26	M	St. STEPHEN, 1st Martyr.	5	A 7	0	25		
27	Tu	St. JOHN Ap. and Evang.	6	3	1	15		
28	W	Innocents Day.	7	1	2	2		
29	Th	Lockhill, Som.	8	4	2	47		
30	F	Maiden Bradley, Wilts.	9	8	3	35		
31	S	Silvester Bish. of Rome.	10	13	4	15		

M	U	☉ Rises	☉ Sets	☿ Sets	♂ Rises	♂ Rises	♀ Sets	♀ Rises	Cl. flow.							
1	7 ^u	57	4 ^h 3	9	A 10	7	M 11	9	A 29	6	A 55	7	M 10	10	25	
6	8	1	3	53	8	59	6	55	9	13	7	6	7	33	8	21
11	8	5	3	55	8	40	6	40	8	56	7	19	7	57	6	6
16	8	7	3	53	8	20	6	24	8	37	7	31		Sets	3	42
21	8	8	3	52	8	1	6	7	8	15	7	42	3	A 52	1	11
26	8	7	3	53	7	41	5	50	7	52	7	54	4	6	1	Fall 20

**A TABLE of all the KINGS and QUEENS of
England since the Conquest.**

The Year of the Birth of each King and Queen; also the Year, Month, and Day, whereon they began to reign: beginning the Year the first Day of January, 1757.				The Length of each Reign.				The Years expired since each Reign be- gan and ended.	
Names.	Born.	Began to Reign.	Y. M. D.	Reg.	End				
William Conq.	1027	1066	October 14	20	10	26	690	669	
William Rufus	1057	1087	Septem. 9	12	10	24	669	656	
Henry I.	1058	1100	August 23	35	4	0	656	621	
Stephen	1105	1135	Decem. 1	18	10	24	621	602	
Henry II.	1134	1154	October 25	34	8	11	602	567	
Richard I.	1156	1189	July 6	9	9	0	567	557	
John	1166	1199	April 6	17	6	13	557	540	
Henry III.	1207	1216	October 19	56	1	0	540	484	
Edward I.	1239	1272	Novem. 16	34	7	21	484	449	
Edward II.	1284	1307	July 7	19	6	13	449	429	
Edward III.	1312	1327	January 20	50	5	1	429	379	
Richard II.	1366	1377	June 21	22	3	8	379	357	
Henry IV.	1367	1399	Septem. 29	13	5	21	357	343	
Henry V.	1389	1413	March 20	9	5	11	343	333	
Henry VI.	1421	1422	August 31	38	6	4	334	294	
Edward IV.	1442	1461	March 4	22	1	5	295	273	
Edward V.	1471	1483	April 9	0	2	13	273	273	
Richard III.	1443	1483	June 22	2	2	0	273	271	
Henry VII.	1457	1485	August 22	23	8	0	261	247	
Henry VIII.	1492	1509	April 22	37	9	6	247	209	
Edward VI.	1537	1547	January 28	6	5	8	209	209	
Mary I.	1516	1553	July 6	5	4	11	203	198	
Elizabeth	1533	1558	Novem. 17	44	4	7	198	153	
James I.	1566	1603	March 24	22	0	3	153	131	
Charles I.	1600	1625	March 27	23	10	3	131	107	
Charles II.	1630	1649	January 30	36	0	7	107	71	
James II.	1633	1685	February 6	4	0	7	71	62	
{ William III.	1662	1689 Feb.	13	5	10	15	67	54	
{ Mary II.	1650								
Anne	1665	1702	March 8	12	4	24	54	42	
George I.	1660	1714	August 1	12	10	10	42	29	
George II.	1683	1727	June 11	whom God preserve.					

A Compendious TABLE of INTEREST,
 Shewing the Interest of any Sum of Money, from a Million
 to a Pound; for any Number of Days, at any Rate of
 Interest.

N ^o .	l.	s.	d.	q.	N ^o .	l.	s.	d.	q.
1000000—	2739	14	6	0,99	1000—	2	14	9	2,14
900000—	2465	15	0	3,29	900—	2	9	3	3,12
800000—	2191	15	7	1,59	800—	2	3	10	0,11
700000—	1917	16	1	3,89	700—	1	18	4	1,10
600000—	1643	16	8	2,19	600—	1	12	10	2,80
500000—	1369	17	3	0,49	500—	1	7	5	3,70
400000—	1095	17	9	2,79	400—	1	1	11	0,50
300000—	821	18	4	1,09	300—	0	16	5	1,40
200000—	547	18	10	3,40	200—	0	10	11	2,30
100000—	273	19	5	1,70	100—	0	5	5	3,01
90000—	246	11	6	0,32	90—	0	4	11	0,71
80000—	219	3	6	0,96	80—	0	4	4	2,41
70000—	191	15	7	1,59	70—	0	3	10	0,11
60000—	164	7	8	0,22	60—	0	3	3	1,81
50000—	136	19	8	2,85	50—	0	2	8	3,51
40000—	109	11	9	1,48	40—	0	2	2	1,21
30000—	84	3	10	0,11	30—	0	1	7	0,90
20000—	54	15	10	2,74	20—	0	1	1	0,60
10000—	27	7	11	1,37	10—	0	0	6	2,30
9000—	24	13	1	3,23	9—	0	0	5	3,67
8000—	21	18	4	1,10	8—	0	0	5	1,40
7000—	19	3	6	2,96	7—	0	0	4	2,41
6000—	16	8	9	0,82	6—	0	0	3	3,76
5000—	13	13	11	2,58	5—	0	0	3	1,15
4000—	10	19	2	0,55	4—	0	0	2	2,52
3000—	8	4	4	2,41	3—	0	0	1	3,80
2000—	5	9	7	0,27	2—	0	0	1	1,26
1000—	2	14	9	2,14	1—	0	0	0	2,63

R U I. E.

Multiply the Sum by the Number of Days; and that Product by the Rate per Cent. Then cut off the two last Figures to the Right Hand, and the rest you must find in the Table.

Example, What is the Interest of 100 l. for 365 Days at 5 per Cent.

N ^o . of Days	Then in the Table
multiply by 100	against 1000 is 2 14 9 2,14
Product 36500	800 2 3 10 0,11
multiply by 5 Rate p. Cent.	20 0 1 1 0,60
1825100	5 0 0 3 1,15
	Answer 5 0 00,00

The GENT. Diary; or, Math. Repository. 17

To our ingenious and worthy CONTRIBUTORS.

GENTLEMEN, &c.

IN our two last DIARIES, for the Years 1755 and 1756, We desired all our CONTRIBUTORS to be so honest as to send us their own Performances, &c. And further (*Gentlemen*) we did, in 1756, assure you, that whoever should, for the future, be found guilty of such Practices, we would not fail to expose them to the World: accordingly (though with great Reluctance) we now publish the following Observation of Mr. Samuel Bamfield's, of Honiton in Devonshire, verbatim, viz.

The 4th. ENIGMA, pretended by Timothy Drury to be his own, is entirely taken from the ingenious and Rev. Mr. John Pomfret's Poem; for, Mr. Drury's 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, and 20th Lines are the 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, and 48th Lines of Mr. Pomfret's Poem on Love triumphant over Reason; and pretty well toward the latter End of the same Poem, Page 22, are the first four that Drury makes use of; and his following four, viz. 5, 6, 7, and 8th, in the same Book, in a Poem entituled Reason, are there the 7, 8, 9, and 10th.—I hope you'll write to him hereof; and lash him, as he deserves; he being most openly and notoriously (as is shewn) a Yorkshire-Bite.—If he will very submissively ask your Pardon, and make a tolerable Defence, and an elegant Apology for his Plagiarism, you may be moderate in (your Correction or) exposing him, if he heartily and sincerely desires it.—But was he left to my Mercy; I would compose half a dozen of the most satyrical Lines upon him I could, and have them published.

Of the ECLIPSES, this Year 1757.

THERE will be four Eclipses, two of each Luminary. On February the 4th, at 7 o'Clock in the Morning, the Moon will be eclipsed $6^{\circ} 43'$, in Ω 16° , part only visible, because the Moon sets eclipsed.

February the 18th, at 10 o'Clock, the Sun will be eclipsed in the Beginning of π ; so small as to be invisible.

July the 30th at 50' past 11 at Night, the Moon will be eclipsed $11^{\circ} 32'$ in ω $7^{\circ} 50'$ visible.

August the 14th at 45' after 10 at Night, the Sun will be eclipsed in Ω $22^{\circ} 10'$ invisible.

We may also expect, towards the latter End of this Year, or in the Beginning of the next (1758.) the Return of the famous Comet of 1682. Which (it is to be hoped) will not be attended with any of those dire Effects dreamed of by some Philosophers!

CHARLES WILDBORE.

B

Careless

Careless Jack of Cambridge, has sent the following *Calculation* of the *Moon's Eclipse*, from *Mr. Flamsteed's*, and *Mr. Dunthorne's Tables*.

		FLAMSTEAD'S.				DUNTHORNE'S.			
In the Year 1757, the equal Time of the true Opposition of the Sun and Moon is,		D. H. ' "				D. H. ' "			
At which Time		Feb. 3 19 22 4				3 19 14 26			
		S. 0				S. 0			
The mean Anomaly of the EARTH		7 6 42							
The Sun's true Place		10 15 47 22				10 15 46 11			
Annual Argument		7 6 22 22							
Moon's true Place in her Orbit		4 15 47 22				4 15 44 28			
Her true hourly Motion		30 59				Ecliptick 30 14			
Sun's true hourly Motion		2 32				2 32			
Hourly Motion of Moon and Sun		28 27				in Eclip. 27 42			
Argument of Latitude		11 23 11 50				11 23 11 13			
Absolute Equation of Days		Add 10 2				9 59			
The apparent Time of 8 in Orbit		3 19 12 46							
Time of Reduction Add		3 47				1 43			
The apparent Time of 8 in Ecliptick		3 19 16 33				4 15 46 11			
Moon's horizontal Parallax		55 44				54 35			
Sun's D ^o .		10				10			
Sum of the horizontal Parallaxes		55 54				54 45			
Semidiameter of Sun		16 19				16 21			
Semidiameter of EARTH'S Shadow		39 35				38 24			
						increased 39 14			
Moon's Semidiameter		15 7				15 8			
Semidiameter of Moon and Shadow		54 42				54 22			
Moon's Latitude South		37 36				37 38			
The Angle of the way of the Moon and Sun, with a Circle of Lat.		84 18							
The nearest approach of the Centers of Moon and Shadow		37 2							
Parts deficient		17 6				17 9			
Digits eclipsed		6 47 3				6 47			
The Time between the true and mean Eclipse						7 57			
Equal Time of the greatest Obscuration						3 19 6 29			
E. Ap. Time of the greatest Obscuration		3 19 8 59				3 19 16 28			
Motion of Semi-duration		39 43				37 28			
Time of Semi-duration		1 23 46				1 20 42			
The Beginning		3 17 45 13				3 17 55 46			
The End		3 20 32 45				3 20 37 10			
		H. ' "				H. ' "			
Duration		2 47 32				2 41 24			

Mr. Luke Elstob calculates 1757, Feb. 3. — 19h. 6, Digits 6 43

Mr. Edward Greensted's for LONDON and ROCHESTER.

LOND. Ap. Time Morning beg. 5h. 21' Mid. 6h. 46' End 8h. 11'. Dur. 2h. 50.

ROCHESTER,

5 23

6 48

8 13

Answers

The GENT. Diary; or, Math. Repository. 19
Answers to the QUESTIONS in last Year's *Diary*.

1 Question (151) answered by Mr. *Lionel Charlton*.

SUPPOSE

$a = ,7854$

= Area of Unity;

$x = 20 = CO$;

$y = 25 = AO$;

p = Parameter
of the Catenary;

$u = AC$; and

$z = CF$; then

by the Nature of

the Catenary,

$uu = 2px + xx$.

Whence $u =$

$\sqrt{2px + xx}$;

$\dot{u} = \frac{p\dot{x} + x\dot{x}}{\sqrt{2px + xx}}$;

and $j = \sqrt{\dot{u}^2 - \dot{x}^2} = \frac{p\dot{x}}{\sqrt{2px + xx}}$;

the Fluent of which
gives $y = p \times$ Hyperbolic Logarithm. $\frac{p}{p+x+\sqrt{2px+xx}}$.

In which Equation the Value of p , by the Method of Trial
and Error is found = 18,233. Now, since $x - z = DE$;

and $p \times$ Hyp. Log. $\frac{p}{p+z+\sqrt{2pz+z^2}} = DF$. Therefore,

putting $F =$ Hyp. Log. $\frac{p}{p+z+\sqrt{2pz+z^2}}$, the Content of

the Cylinder will be $8apF \times \frac{x^2 - 2xz - z^2}{p}$, which (by the
Quest.) is to be a *Maximum*; whence we have $2Fzx\dot{z} - 2xF\dot{z}x +$

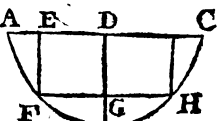
$\frac{\sqrt{2px+xx}}{x^2\dot{z} - 2xz\dot{z} + z^2\dot{z}} = 0$; which being divided by $x\dot{z} - x\dot{z}$
gives $2F + \frac{z - x}{\sqrt{2px+xx}} = 0$. And this Equation being

solved, by the Method of Trial and Error, gives $z = 3,928$.
Consequently the Length of the Cylinder is 24; and its Dia-
meters each = 32,144.

The same answer'd by *Cha. Wildbore*.

Let $DB = a$; $AD = b$; $GB = x$; $A E = D$ C
 $FG = y$; and the *Tension* at B, or Pa-
rameter of the Curve = p ; then the

Equation of the Curve being $\frac{x^2 + y^2}{2} =$

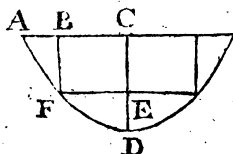


$-1 = \frac{x}{p}$; we have $y = \frac{p \dot{x}}{\sqrt{2px+x^2}}$. The Fluent of which corrected is $y = p \times \text{Hyp. Log. } \frac{p+a+\sqrt{px+x^2}}{p}$, which

Equation (when FG becomes = AD; and GB to DB) being turned into a Series and reverted; will give $p = 18,232$. Now $FG \times DG^2 = y \times a^2 - 2ax + x^2$; being, as (the Solidity of the Cylinder is a *Max.*) fluxed and reduced, gives $y = \frac{2yx}{a-x} =$

$\frac{p \dot{x}}{\sqrt{2px+x^2}} \therefore y = \frac{p \times a - x}{2\sqrt{2px+x^2}} = p \times \text{Hyp. Log. of } \frac{p+x+\sqrt{2px+x^2}}{p}$; whence $GB = x = 3,89$; $FH = 23,426$; and the Solidity of the Cylinder = 19091,6, may be found.

The same answered by *Tabularius*, the Proposer.



Let $AC = 25 = b$; $CD = 20 = c$; $3,1416 = m$; $DE = x$; $CE = BF = c - x$; and $FE = BC = y$. Then by the Property of the *Catenaria*, $b = 2,30258 a \times \text{Log. } \frac{a+c+\sqrt{2ac+c^2}}{a}$

from which a may be found. Now, the Solidity of the Cylinder will be expressed by $2m y \times c^2 + 2cx + x^2$, a *Maximum*.

In *Fluxions*, $c^2 \dot{y} - 2cx \dot{y} - 2cy \dot{x} + a^2 \dot{y} + 2yx \dot{x} = 0 \therefore y = \frac{2cy \dot{x} - 2yx \dot{x}}{c^2 - 2cx + x^2} = \frac{2y \dot{x}}{c - x} = \frac{a \dot{x}}{\sqrt{2ax+x^2}}$ by the Nature of the

Curve $\therefore y = \frac{a \times c - x}{2\sqrt{2ax+x^2}}$; and $\therefore \frac{c-x}{\sqrt{2ax+x^2}} = 4,60516 \times$

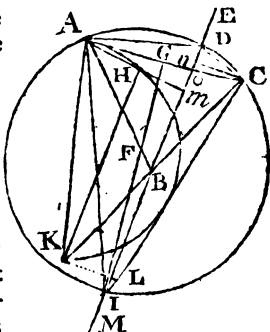
$\text{Log. } \frac{a+x+\sqrt{2ax+x^2}}{a}$; from whence x may be found, and thence y ; and consequently the Solidity of the Cylinder required.

N. B. The above was inserted before we received his Solution this Year, in which he brings out $a = 18,232$; $c - x = 16,1064$; $2y = 23,4258$; and thence the Solidity = 19091,59797.

It was answered in the same Manner, by Mess. *Bamfield* and *Garrard*, whose Numbers agree with the above inserted. Mess. *Bewil*, *Gaskill*, *Kingston*, and *Rebush*, supposing AC instead of 2 A C. given = 50, find $a = 65$ and $BC = 22,7$.

(2) Question 152. answered by Mr. Charles Wildbore.

Construction. Let AB and BC be the two given Lines, including the given Angle ABC; produce the Side BC till BK becomes equal to BC; draw AK, upon which describe the Semi Circle AHK; on which from the Point A, set off AH = the given Difference of the Perpendiculars; draw HK \parallel to which through the angular Point B, draw the indefinite right Line EM. Bisect AC in G, and at G erect the Perpendicular GI, meeting EM in I;



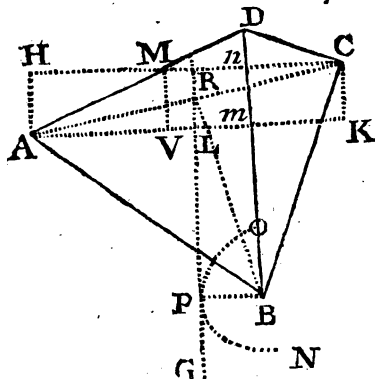
draw AI, and IC; and circumscribe a Circle about the Isosceles Triangle AIC, which shall cut the Lines EM in D; draw AD and DC, so shall ABCD be the required Trapezium.

Demonstration. Produce AH to m , and parallel thereto draw n C and KL; also join AF, CF; then KB being = to BC, and the Angles n BC, and KBL = to each other; and the Angles n and m , being right Angles, the two Triangles n BC, KBL are not only *similar* but *equal*; and \therefore AH is the given Difference of the Perpendiculars. Also the Triangle AIC being Isosceles, the Arcs AI, and IC, are equal. Consequently the diagonal IBD, divides the Angle ADC into two equal Parts.

Q.E.D.

Calculation. First, in the Triangle ABC, there are given AB, BC, and the Angle ABC, to find the rest. *Secondly*, in the Triangle ABK; are given AB, BK; and the Angle ABK, to find the rest. *Thirdly*. In the right angled Triangle AHK, are given AH, and AK, to find the rest. *Fourthly*, In the right angled Triangle Am B, are given AB, and the Angle m AB (HAK—KAB) to find the rest. *Fifthly*, and in the right angled Triangle Am O, there are given Am , and the Angle OAm , to find the rest. And *sixthly*, In the right angled Triangle OGI, are given GO, and the Angles, to find the rest. And then, *seventhly*. In the right angled Triangle CGI, there are given GC, and GI, to find the Angle GCI; which as it is contained in the same Segment of a Circle as ADI, must be equal to it. And therefore, *lastly*, in the Triangle ADC, there is given the Side AC, and all the Angles; to find $AD = 50,8$; $DC = 19$; and the whole Area of the Trapezium = 174,44.

The same answered by Mr. Tho. Garrard.



Construction. Draw AC, which bisect in R, with the Radius $BP =$ half the Difference of the Perpendicular Am and Cn , describe the Arch OPN ; from the Point R, draw RG , to touch the Circle at P; and thro' B, and \parallel to RG draw BD for the Diagonal of the Trapezium. In the perpendicular Cn continued, take $nM = nC$, and thro' the Points

A and M, draw AD to cut BD in the Point D; lastly, draw DC which compleats the Trapezium sought.

Demonstration. Let the Parallelogram HK be compleated; then because RG (by Construction) is a Tangent to the Circle NPO in the Point P; the Angle BPL is a right one; and seeing RP is parallel to DB , and also bisects the Diagonal AC ; it must also bisect the Sides HC and AK : and therefore PB , Lm , and Sn , are all equal and parallel, and $Am - Cn = 2PB$ as required. Lastly, because $nM = nC$, and Dn is perpendicular thereto, therefore the Angle ADC is bisected by BD . *W. W. D.*

Trigonometrical Calculation. In the Triangle ABC are given $AB = 60$, $BC = 50$, and the Angle $ABC = 74^\circ$, whence AC is had $= 66,67966$. The Angle $CAB = 46^\circ 7' 16''$; and $ACB = 59^\circ 52' 44''$. Then in the $\triangle BRC$ is known $RC = (33,33983) =$ half AC , and BC , and the Angle RCB ; whence we get $BRC = 79^\circ 12' 7\frac{1}{2}''$; $RBC = 40^\circ 55' 9''$, and $RB = 44,02778$. Now in the right angled Triangle BPR is known BR and BP , whence we have the Angle $PRB = RBD = 19^\circ 55' 9''$. $\therefore DBA = 53^\circ$ and $DBC = 21^\circ$. Now in the right angled Triangles AmB , and CnB are known a Side and an Angle in each, whence we get $Bm = 36,1088$, $Am = 47,9184$, $Bn = 46,6790$, and $Cn = nM = 17,9814$. Draw MV parallel to DB , then $Am - Mn = AV = 30$, and $Bn - Bm = MV = 10,5702$. Then by similar Triangles $AV : VM :: Am : mD = 16,8836$. $\therefore BD = 52,9924$. and the Area $= 1744,4178$.

After the first of these Methods it was answered by Mr. Moss the Proposer: and according to the latter by Mr. Enesfer. It was also algebraically solved by Mess. Bamfield, Charlton, Grimes, Kingston, Rebus, and some others. Mr. Gaskell has constructed it in a Manner somewhat different on both, but Room will not admit its Publication.

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(3) Quest. 153. answered by Mr. *Will. Kingdon*.

Let $a = 62,5$ ft. the Weight of a Cubic Foot of Water; $c = 5,236$; $b = 9,2989$; $d = 1,25$, x = Diameter of the Globe; and y = a Cubic Foot of Wood. Then, as $a : cx^3 :: y :$

$\frac{cyx^3}{a}$ = the Cubic-Inches in the Water. And as $b : 1 :: \frac{cyx^3}{ab}$: the Cubic Inches immersed in the Liquor. Hence $12cx -$

$16c = ca^3 - \frac{cyx^3}{a}$ = the Solidity of the Segment above the

Water; and $3cdx^2 - 2cd^3 = cx^3 - \frac{cyx^3}{ab}$ = the Solidity of the

Segment above the Liquor. From the former we get $y = a$

$+\frac{16a}{x^3} - \frac{12a}{x^2}$; which wrote for y in the following, gives

$3abd^2x - 2abd^3 = abx^3 + ax^3 - 16a + 12ax$. $\therefore 16 - 2bd^3 = bx^3 + x^3 + 12x - 3bd^2x$. Solv'd, gives $x = 9,51$ = the Diameter.

The same answered by Mr. *Zach. Gaskell*.

Put $m = 2$; $n = 1,25$; $c = 3,1416$; $p = 5,236$; and x for the Sphere's Diameter. Then by common *Theorems* $px^3 - \frac{1}{2}cxm^2 + \frac{1}{3}cm^3$ will be the Solidity of the immersed Segment in the denser Fluid; and $px^3 - \frac{1}{2}cxn^2 + \frac{1}{3}cn^3$ the Solidity when in the other. Now as the Density of all Bodies are to each other inversely as the Solidity of the Space occupied; it will be as $px^3 - \frac{1}{2}cxm^2 + \frac{1}{3}cm^3 : px^3 - \frac{1}{2}cxn^2 + \frac{1}{3}cn^3 :: 9,2989 : 1$. After multiplying Extremes and Means, and clearing the Equation, we shall have $108,986x - x^3 = 176,401$. Solv'd $x = 9,509$, the required Diameter.

Mr. *Samuel Bamfield* answers it thus.

Put $s = 5,236$ = a Globe's Solidity, whose Axis = 1; $a = 9,2989$, $c = 2$; $d = 1,25$; and x = Globe's Diameter; hence sx^3 = it's Solidity, and $sx^3 - 3ccsx + 2c^3s$ = the immersed Part in the Water; and $sx^3 - 3ddx + 2d^3s$ = the immersed Parts in the other Liquid \therefore by Hydrostatics, the immersed Parts will be inversely as the Densities of the Liquids; whence $a \times sx^3 - 3ddx + 2d^3s = sx^3 - 3ccsx + 2c^3s$. $\therefore ax^3 - 3addx + 2ad^3 = x^3 - 3ccx + 2c^3$; which Equation solved, $x = 9,5089$ = the Globe's Diameter required.

The same answered by the Proposer, Mr. *Abr. Bosham*.

Let D = the Diameter of the Globe; $b = 2$; $m = 1,25$, and $a = 9,2989$. Also let $p = 0,5236$; then pD^3 = the Globe's Solidity; and $pD^3 + 2pb^3 - 3pDb^2$ = a Bulk of Water equal in Weight to the Globe, being also equal to the Solidity of that

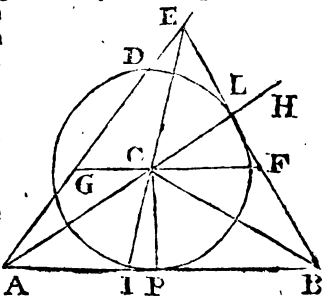
The GENT. Diary; or Math. Repository. 25

Construction. Draw AC for the Meridian, in which set off $AD = 2$, and $DC = 3$. Also draw AE and AB, of a convenient Length; the former making an Angle of 3 Points, and the latter of 5 Points with AC; upon A as a Centre, with the Radius DC, describe the Arch *de*; and let fall the Perpendicular *do*. Again, with one Foot of the Compasses in A, with the Radius AD, describe the Arch *bD*, and let fall the Perpendicular *bf*; make $Aa = do$, and upon *a*, with the Radius *bf*, describe the Arch *br i* thro' *a*, and the Point of Intersection *r*, draw *ar*; then thro' C, and parallel to *ar*, draw BC. Lastly, thro' D and Point B draw DB; so shall O and B be the true Position of the Steeples required.

For *ar* and *Aa*, are respectively $= cm$ and pn by Construction; also *ar*, is parallel to BC \therefore by similar Triangles AB : BC :: cm : pn the same Analogy as before; from which Analogy and Axiom the first of plain Trigonometry, we get the Angle ACB $= 53^{\circ} 35' 6''$, whence we have Data enough to find the Distance of the Steeples, $= 2,130272$ Miles; and their Bearing $60^{\circ} 2' 25''$ to the Northward of the *West*, and Southward of the *East* of each other.

The same constructed and answered by Mr. Zach. Gaskell, the Proposer.

Construction. Draw AB for the Meridian, and the indefinite Lines AH and AE, making their respective Angles with AB, according to the Data, then on the Line AH as at C (taken any where at Pleasure) describe the Circle PLD with the extent of the Perpendicular CP; thro' C draw FG parallel to AB, make CF to CG, as 3 to 2. Then thro' F, draw BE, so as just to touch the Circle's Periphery; thro' C draw EI; then will I be the Inn; B the last Place of Observation; and C and E, the Situation of the two Steeples.



This Way of Construction (which I did not think of till after the Solution was sent last Year) points out a Method to resolve it by common Trigonometry only; for as $\text{Sine} \angle GAC : GC (\approx) :: \text{Sine} \angle EGC : AC$. And as $\text{Rad.} : AC :: \text{Sine} \angle CAI$ to the Rad. of the Circle $= CP = CL$ (L being the Tang. Point of the Line EB) then as $CF (3) : \text{Rad.} :: CI : \text{Sine} \angle LFC = \angle EBA = 53^{\circ} 35' 6''$, which being had, calling AI (2) and BI (3) proceeding in the Operations BE will be found $= 4,419547$, and

26 Questions in 1756, answer'd.

and $IE = 3.57644$, and the Cosine of the $\angle BIC = 6^\circ 2' 30''$. The very same that results from the other Method, being their Bearing from the *Inn* so much northerly from the West; then as the Angle is bisected by the Line BC , as $IB : BE :: IE - CE : CE$. Whence $CE = \frac{IE \times BE}{IB + BE} = 2.1303$ Miles, as before.

Mr. *Enefer* has also constructed this *Problem*, in a manner not much different from that of Mr. *Garrard's*. It was also algebraically solved, by Mess. *Bamfield, Grimes, Holroyd, Kingston*, and several others.

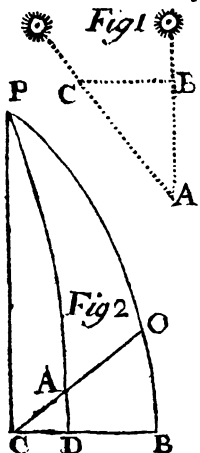
5 Question (155) answer'd by Mr. *Tho. Hare*.

I find per Trigonometry (see the Fig. in last Year's Diary) the Angle $BAC = 36^\circ 52' 11''$, the Difference of the Amplitudes of the Sun on *April* 1st, and *June* 7th. Now, by the Question, and Prob. 24th of Mr. *Simpson's Trig.* as $Tang. 9^\circ 5' 15'' : Tang. 13^\circ 42' 39'' :: Tang. 18^\circ 26' 6'' : Tang. 26^\circ 57' 1'' =$ half the Sum of the Amplitudes; hence the Amplitudes are separately known. Consequently the required Latitude is $57^\circ 1' 14''$.

The same answered by Mr. *Tho. Garrard* of *Ipswich*.

In the right angled (in this Case) plane Triangle ABC are given all the Sides; whence by plain Trig. we get the Angle $A = 36^\circ 52' 12'' =$ the Difference between the Sun's Amplitude on the 1st of *April* 1754, and the 7th of *June* following.

Now let P represent the North Pole, CB Part of the Equinoctial, CO Part of the Horizon of the Place sought, PC the Hour-Line of 6 o'Clock; PA and PO , other Hour Lines cutting the Horizon in the Points A and O , where the Sun was observed to rise on the 1st of *April*, and 7th of *June* respectively.



Then in the spherical Triangle PAO , is known $PA = 85^\circ 28'$, and $PO = 67^\circ 14'$ (the Sun's Distance from the North Pole, at his rising on the 1st of *April*, and 7th of *June* respectively) and AO the Difference of his Amplitudes at those times; whence the angle PAO will be found $= 57^\circ 13' 47''$.

Now in the right angled spherical Triangle CAD is known the said Angle A , and the side $AD = 4^\circ 32'$, the Sun's Declination at his rising on the 1st of *April* 1754. Whence the Angle ACD will be had $= 33^\circ 2' 52''$, whose Complement is $56^\circ 57' 8''$, the Latitude required.

The same answered by Mr. Will. Enefer.

The Triangle ABC (see the above Scheme, Fig. 1.) being right angled at B, the Angle A is found $= 36^{\circ} 52' 12''$. Then in Fig. 2. we have given PO and PA (each respectively equal to the Sun's Distance from the North Pole, at his rising on June 7, and April 1) $= 67^{\circ} 14'$, and $85^{\circ} 28'$ respectively; also AO, the Difference of his Amplitudes at those Times (found as above) $= 36^{\circ} 52' 12''$, whence the Angle PAO = CAP is found $= 57^{\circ} 13' 47''$. Then in the right angled Triangle CDA, are known DA $= 4^{\circ} 32'$ (= Complement of PA to a Quadrant) the Angle A as found above, and the right Angle D. Whence the Angle DCA is found $= 33^{\circ} 2' 52''$, whose Complement $56^{\circ} 57' 8''$, is the Latitude required.

The same answered by Mr. Cha. Mason, Jun. of Sapperton.

Let a and b = the Sine of the Sun's Declination, on April 1st, and June 7; p and q = the Sine and Cosine of $36^{\circ} 52' 11''$ = Diff. of Amplitudes; x , and y = Sine and Cosine of the Sun's Amplitude on June the 7th; then will $qx - py$, express the Sine of his Amplitude on the 1st of April; by Spherics, as $x : 1$

(= Rad.) :: $b : \frac{b}{x}$ = Cosine Lat. And, as $qx - py : 1 :: a : \frac{a}{qx - py}$ = Cosine Lat. Hence $\frac{b}{x} = \frac{qx - py}{a} \cdot \frac{bq - a}{bp} = \frac{y}{x} = .9871657 =$

Cotan. of $45^{\circ} 22' 12''$. Hence the Lat. required $= 57^{\circ} 0' 28''$ N.

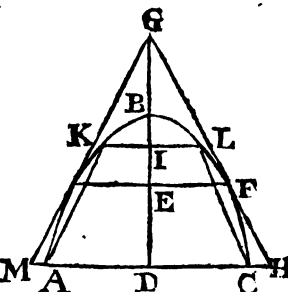
This Question was also truly and methodically solved by Mess. Bevil, Bosham, Drury, Gaskell, Holroyd, Kingston, Spicer, and several others. See the Catal.

6 Quest. (156) answer'd by Mr Cha. Wildbore of Nottingham, the Proposer.

Let $p = 3.1416$, s = the Solidity, c = the Convex Surface; a = the Parameter. and $x = BD$; then

will $\frac{p \times a^2 + 12x^2}{6a} - \frac{p a^2}{6} = c$, and $\frac{p a x^2}{2} = s$, from which Equations

a and x may be found. And when the circumscribing Cone is a Min. GE will $= \frac{2}{3}GD$ (vide my Solution to Qu. 8) For the greatest inscribed Conic Frustrum, let KI



$= y$, $AD = Bb$, then $c = \frac{y^2}{a} = ID$; and (by a well known The-

orem) $c - \frac{y^2}{a} \times \sqrt{pb^2 \times py^2 + pb^2 + py^2} =$ the Solidity of the Frustr. a Max. in Fluxions is $bca y y + 2 a c y y - 3 b y^2 y - 2 b y^2 y - 4 y^3 j = 0$; reduced $4 y^3 + 3 b y^2 = bca$, from which y may be found.

The Dimensions of the Paraboloid were intended to have come out in whole Numbers; but thro' a numerical Error in finding the convex Surface, the Question now admits of two affirmative Answers, both in broken Numbers.

The same answered by Mr. T. Drury of Great Houghton, Yorksh.

Let s = Superficies of the Paraboloid, Q = Solidity, $p = 2.0944$,

$q = 0.3927$, x = Abscissa, and zy = Ordinate; also let $\frac{q}{Q} = a$; then $x = \frac{a}{4y^2}$, which being substituted in the following Equation

for the Superficies, we have $\sqrt{\frac{a^2}{4y^4} + y^2} + \sqrt{\frac{a^2}{4y^4} + y^2 + yxy} = \frac{s}{p}$,

reduced $y = 64.1229$, and $x = 5.0431$. Now, for the least circumscribing Cone, put $a = DB$ (see Fig. above) $b = DA$, $p =$

$.7854$, and $x = BG = BE$; and per Conics $a : b^2 :: x : \frac{b^2 x}{a} =$

EF ; and per sim. Triangles $2x : 2\sqrt{\frac{b^2 x}{a}} :: a + x : b$

$\sqrt{\frac{a^2 + 2ax + x^2}{ax}} = MH$; whence its Solidity is $pb^2 x$

$\frac{a^3 + 3a^2 x + 3ax^2 + x^3}{3ax}$ a Min. in Fluxions and reduced gives $x =$

$\frac{1}{2}a$; hence we see the Paraboloid cuts the Cone at $\frac{2}{3}$ of its Altitude, and consequently its Solidity becomes known. Again, for the greatest inscribed conic Frustum put a = Abscissa, b = Semiordinate, and $x = ID$ the Height of the Frustum; then per

Conics $2\sqrt{\frac{ab^2 - b^2 x}{a}} = KL$; and its Solidity $\frac{4pb^2}{3} x \sqrt{\frac{ax^2 - x^3}{a}}$

$\frac{+ 2ax - x^3}{a}$ a Max. in Fluxions $\frac{2axx - 3x^2x}{2\sqrt{a^2 x^2 - ax^3}} + \frac{2ax - 3x^2x}{a}$

$= 0$. Thrown into Numbers is $x^3 - 12.2925x^2 + 57.2238x = 96.195$; whence $x = 3.997$, and likewise its Solidity is easily found. Q. E. I.

The same answered by Mr. W. Spicer of Allesley, near Coventry.

Put the curve Surface $= 12996.3609 = d$, the Solidity $= 32572.1088 = s$; $c = 0.7854$, y = Semiordinate AD, and x = Abscissa BD, then by the Doctrine of Fluxions is had

$\frac{2c}{3} x \sqrt{\frac{y^2}{x^4} \times y^2 + 4x^2}^3 - \frac{2cy^4}{3x^2} = d$, and $2cy^2 x = s$; from

which two Equations (by Substitution) we have $128s^2 x^5 - 9d^2 cx^4 + 48s^2 cx^3 - 3d^2 x = -5s^3$; solved $x = 5.0505$ and $y = 64.07598$. For the least circumscribing Cone, put $b = AD$, $a = BD$, and $x = CD$. Th. per Property of the Curve $a : b^2 ::$

$x - a : \frac{b^2}{a} \times x - a = \overline{FE}^2$; and (by sim. Triangles) $4 \times \overline{x - a}^2 : \frac{b^2}{a} \times x - a :: x^2 : \frac{b^2}{4a} \times \frac{x^2}{x - a} = \overline{MD}^2$; Th. $\frac{cb^2}{3a} \times \frac{x^3}{x - a} = \text{Cone's Solidity, a Maximum}$; in Fluxions and reduced gives $x = \frac{3a}{2}$.

$= 7,57575$; and $MD = \frac{3b}{2\sqrt{2}} = 67,9628$. Again, for the

greatest inscribed conic Frustum, put $x = 1L$. Th. $b^2 : a :: x^2 :$

$\frac{ax}{b^2} = BI$, and $a - \frac{ax}{b^2} = ID$; Th. $\frac{b^4 + b^3x - x^4 - bx^3}{\frac{3}{4}b^2} = \text{conic}$

Frustum, a Maximum. In Fluxions and reduced $b^3 - 4x^3 - 3bx^2 = 0$. Solved $x = 29,181$. *W. W. R.*

This Question was also truly and elegantly answered, by Mess. *Bamfield, Bevil, Charlton, Garrard, Gaskell, Kingston, Mason, Rebus, Tabularius, Thompson*, and others (see the Catalogue.)

7 Question (157) answer'd by Mr. *Will. Enefer*, of *Ipswich*.

Since the Sides of the Triangle are in Proportion as 5, 6, and 8; put $10x = AB$, $12x = BC$, and $16x = AC$. Th. by a well known Rule $19x \times 9x \times 7x \times 3x = 240 \times 20$ (= the Square of

the Area in Poles) $\therefore x^4 = \frac{240 \times 240}{19 \times 9 \times 7 \times 3}$. Solv'd $x = 2,0012551$.

Then $10x = 20,012551$

$= AB = a$, $12x = 24,$

$0150612 = BC = b$; and

$16x = 32,0200816 = AC$

$= c$; then $\frac{240 \times 2}{a} = 23,$

$984948 = \text{perp. BD}$ which

call p . Draw $EF \parallel$ to AC

and let fall the Perpendiculars EG and FH ; and put $BK = z$.

Then by sim. Triangles $p : a :: z : \frac{az}{p} = EF$. Then $p - z \times \frac{az}{p}$

$= \text{Area of the Parallelogram, a Max. in Flux. } az = \frac{2az^2}{p}$. Solv'd

$2z = p$. Th. $EF \left(\frac{az}{p} \right) = \frac{a}{2}$. Hence it appears that the greatest

Parallelogram that can be inscribed in any Triangle is that

whose $\left\{ \begin{array}{l} \text{Altitude} \\ \text{Base} \end{array} \right\} = \frac{1}{2} \text{ the } \left\{ \begin{array}{l} \text{Altitude} \\ \text{Base} \end{array} \right\}$ of the given Trian.

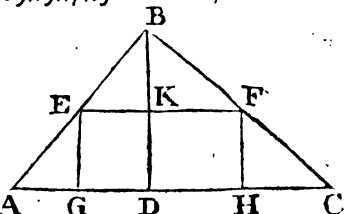
Whence it is evidently impossible for the Parallelogram to become

a Rhombus, unless GE is greater than AE or less than EF . Con-

sequently one Side of the Rhombus must coincide with the mean

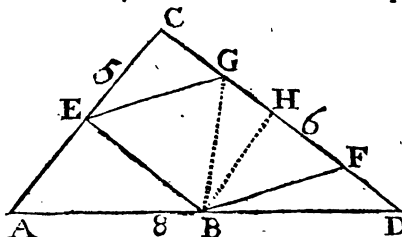
Side of the Triangle; whence the Side of the Fish-pond is $=$

$12,0075306$, and its Area 120 Poles. *W. W. D.*



The same answered by Mr *Zach. Gaskell*.

Put s , m , and p , for the nat. Sines of the Angles A, D, and C;
 $b=AD$, $x=BD$, and $z=EB$ = the required Side; then by



Trig. as $BF(z) : m$

$:: x : \frac{mx}{z} = \text{Sine}$

$\angle BFD$. And as $p :$

$AB(=b-x) :: s : x$;

therefore $x = \frac{sb-sx}{p}$,

whence the Sine of

the Angle $BFD =$

$\frac{p \cdot m \cdot x}{sb-sx}$; this when x into zx or its equal $\frac{sb-sx}{p} \cdot x$ will be =

to the Area of the Rhombus, a *Maximum*. Then will $bx-xx$

be likewise a *Max*. This when fluxed gives $x = \frac{b}{2}$. There-

fore EB being parallel to $CD = \frac{CD}{2}$; whence by the Rule of

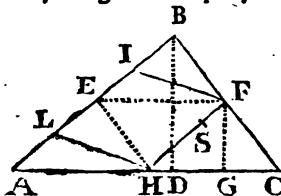
Proportion, the required Sides are 12,0075 Poles respectively.

Consequently as the triangular Space AEB is one fourth of the
 whole Triangle; FB being parallel to CD , and $GF = \frac{CD}{2}$; there-

fore $CG+FD \times$ by the Perpendicular BH is $= GF \times BH$ (*per*
 1 *Eu.* 6.) therefore the Triangles ECG and BFD , are = the
 Triangle AEB . \therefore the Rhombus is half the Content of the Field,
 and equal to the Area of the greatest inscribed Parallelogram.

The same answered by *Nottinghamiensis*.

By the general Property of similar Triangles, the Sides of the



Triangle are easily found, *viz.*

$AC=8,005$; $AB=6,00376$;

and $BC=5,00313$ Chains.

Let each Side of the Triangle

ABC be divided into two equal

Parts, in the Points E , F , and H ;

so shall it be divided into four Tri-

angles EBF , FHE , AEH , and

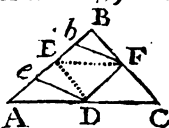
HFC ; equal in all respects to each other, and similar to the whole.

Set off FH from E to S ; and parallel thereto, draw IF , LH ; so
 so shall $FILH$ be the required Rhombus, equal to half the Tri-
 angle ABC ; and equal to the greatest Parallelogram that can
 be inscribed therein. (*Vide Simpson's Geometry*, page 107.)

The

The same answered by *Tabularius*.

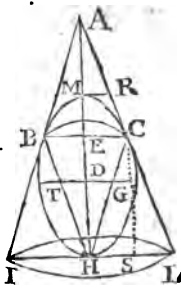
The Sides being 5, 6, and 8, I find the Area = 14,9812; whence, from the given Area = 15 square Chains; I find, by duplicate Proportion, the Sides AC=8,005, AB=6,00376, and BC=5,00313; which being bisected in D, E, and F, the Triangle will be divided into four equal similar Triangles, and therefore into three Parallelograms AF, CE, and BD; each of them equal to half the Triangle, and each a *Maximum*, by the Writers on Fluxions: Now making $Fb=be=eD=DF=3,00188=AE$, the Rhombus Db will be that required, being equal to the Parallelogram AF, or BD.



This Question was also truly and methodically answered by Mess. *Sam. Bamfield, Ab. Botbam, Tim. Drury, Tho. Garrard, Joshua Holroyd, Will. Kingstone, W. Spicer, H. Westman*, and others. See the Catalogue.

8 Quest. (158) answered by Mr. *Cha. Wildbore* of *Nottingham*.

As a greater Figure cannot possibly be inscribed in the Curve HBMC than in its circumscribing Cone IAL, the greatest Cone BHC, that can be inscribed in the Cone IAL will be the greatest that can possibly be inscribed in the Solid HBMC: consequently the Cones and Solid coincide at B and C. It is also easy to conceive, that let the Curve be of what Kind soever it will, or if there be no Curve, the two Cones will still bear the same Relation to each other: And therefore, if we suppose either of them, as for instance, the circumscribing one, to remain fixed; then the inscribed one, being as $EC^2 \times EH$, will, by reason that CS and SL are in a constant Ratio, be as $EC^2 \times SL$, and will be a *Maximum* when $EC=2SL$ (see Mr. *Moss*'s Demonstration in the last Year's Diary, p. 21.) and by similar Triangles $HL : \frac{1}{3} HL (=SL) :: AH : \frac{1}{3} AH (=EH)$ or, which is the same Thing, $\frac{2}{3} : 2 :: EH : AH$. Q. E. D.



The same answered by Mr. *John Thompson* of *Wetherly Bridge*.

Put $HD=t$, $DT=c$, and $ME=x$; then (by Prop. 15 *Steel's*

Conics) $t-x : t :: x : AM = \frac{tx}{t-x} \therefore \frac{tx}{t-x} + 2t = AH = \frac{2t^2-tx}{t-x}$
and $AE = \frac{2tx-x^2}{t-x}$ and (per Conics) $t^2 : c^2 :: 2tx-x^2 : BE^2 \therefore$
 $\frac{c}{t} \sqrt{2tx-x^2} = BE$; and (per sim. Triangles) $\frac{2tx-x^2}{t-x} : \frac{c}{t}$
 $\sqrt{2tx-x^2} :: \frac{2t^2-tx}{t-x} : \frac{c}{x} \sqrt{2tx-x^2} = HL \therefore 2t-x^2 \times$

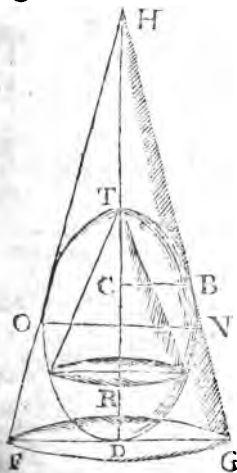
$\frac{1}{tx-x^2}$ is a Min. In Fluxions and reduced $x=\frac{2}{3}t \therefore AH=4t$.

Now put $EH=v$, then $EM=2t-v$; and (per Conics) $t^2 : c^2 :: 2tu-v^2 : BE^2 = \frac{2tv-v^2}{t^2} \times \frac{c^2}{t^2} \therefore 2tv^2-v^3$ is a Maximum. Fluxed and reduced $v=\frac{4t}{3}$; and $\frac{4t}{3} : 4t :: \frac{2}{3} : 2$. Q. E. D.

The same answered by Mr. W. Kingdon of Bath.

Let $a=HM$, $b=TG$, $x=HE$; $a-x=ME$; and by the Property of the Curve we have $a^2 : b^2 :: ax-x^2 : \frac{b^2}{a-x-x^2} = EC^2$; and $\frac{8cb^2x}{3a^2} \times \frac{1}{ax-x^2}$ = the Solidity of the greatest inscribed Cone ($c=.7854$) a Maximum, and in Fluxions is $\frac{32b^2ax\dot{x}-48b^2x^2\dot{x}}{3a^2} = 0$. $\therefore 2a-3x=0$. $\therefore x=\frac{2a}{3}$. Let $y=MR$, and by the Property of the Curve $\frac{b^2}{4y} = IH=HL$, and (by the 4 Eu. 6) we have $HA-a : y :: HA : \frac{b^2}{4y}$. Hence $HA \times y = b^2 \times \frac{HA-a}{4y} \therefore HA = \frac{b^2}{b^2-4y^2}$. Then $\frac{b^2}{6b^2y^2-24y^4}$ = the Solidity of the least circumscribing Cone, a Minimum, and in Fluxions is $\frac{96cab^6y^3\dot{y}-12ab^8y\dot{y}}{6b^2y^2-24y^4} = 0$. $\therefore 8y^2-b^2=0$. $\therefore 4y^2=\frac{b^2}{2}$; whence $HA=2a$. Therefore as $\frac{2}{3} : 2 :: \frac{2}{3}a : 2a$. Q. E. D.

Demonstration, by Mr. Steph. Mescalfe, the Proposer.



Let $TD=a$, $ON=b$, $TC=x$, and $BC=y$; then (by p. 32, of the Introduction to the Doctrine of Fluxions) the Altitude TR of the greatest inscribed Cone equals $\frac{2}{3}a = \frac{2}{3}TD$. Again, by the Property of the Ellipse $\frac{2a^2y^2}{ab^2-2b^2x} = HC$; but $y^2 = \frac{b^2}{a^2} \times ax-x^2$; therefore $HC = \frac{2ax-x^2}{a-2x}$ and, by similar Triangles $HC : 2CB :: HD : FG$, i. e. $\frac{2ax-x^2}{a-2x} : 2y :: \frac{a^2-ax}{a-2x} : \frac{ay}{x} = FG$;

FG; whence $\frac{a^2 y^2}{x^2} \times \frac{a^2 - ax}{3a - 6x}$ or, $\frac{ab^2 - b^2 x}{x} \times \frac{a^2 - ax}{3a - 6x} =$
 $\frac{a^3 b^2 - 2a^2 b^2 x + ab^2 x^2}{3ax - 6x^2}$ is a Min. which in Fluxions is $-3a^4 b^2 \dot{x} +$

$12a^3 b^2 x \dot{x} - 9a^2 b^2 x \dot{x} = 0$. From which, after proper Reduction, and completing the Square, I find $x = a$, or $\frac{1}{2}a$; but it is quite inconsistent, by the Nature of the Problem, that x should equal a ; consequently it equals $\frac{1}{2}a$; hence the Altitude HD of the least circumscribing Cone equals $2a$. Therefore $\frac{2}{3} : 2 :: TR : HD$. Q. E. D.

This Question was also truly solved by Mess. Bevil, Botbam, Easfer, Gerrard, Gaskell, Holroyd, Mason, Spicer, Tabularius, and some others.

(9) Quest. 159. answered by Mr. G. Rebus.

Having the three Sides of the Triangle, find the Segments $IC = 33 = a$; $IA = 42 = b$; and Perpendicular $BI = 56 = c$; $AC = 75 = d$; $VK = u$; $VF = x$; $VH = x$; then (per Property of the Curve, and sim. Triangles) $BI = c : IC = a :: NF = 2x : FE =$
 $\frac{2ax}{c}$. After the same Manner is found $HG = \frac{2bx}{c}$; then
 $lm = \frac{ax + bx}{c}$. Again, as $Br : lm :: BI : CA \therefore d \times c - u =$

$ax + bx$, and per Property of the Curve $vF : FE^2 :: vK : KD^2 =$
 $\frac{4a^2 ux}{c^2}$. Again,

as $vF : vH :: IA^2 : IC^2$; \therefore

$x = \frac{b^2 x}{a^2}$, and

by Substitution

gives $x = \frac{a}{b} \times$

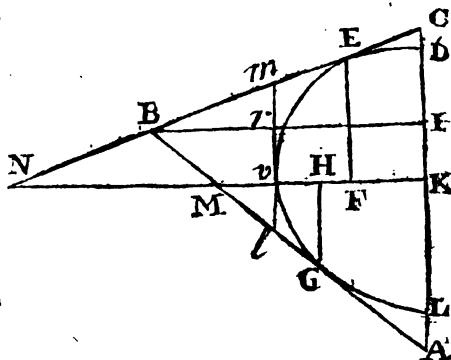
$c - u$, and $KD^2 = \frac{4b^2 ux}{c^2}$. Whence $KD^2 = \frac{4b^2}{c^2} \times c - u^2$;

and $KD = \frac{2}{c} \sqrt{bax - u^2}$; $\therefore \frac{8}{3c} \sqrt{bax - u^2} =$ Area of the

inscribed con. Parabola LGvED, per Question must be a Max. or $cu^3 - u^4$ in Fluxions and reduced, $u = \frac{3}{4} = 42 =$ the Abscissa vK, and Ordinate $\sqrt{3ba} = 64.4825 = LD$. Q. E. D.

C

Corollary.



Hence it appears that the Height of the greatest Parabola that can be inscribed in any Triangle, will be $\frac{3}{4}$ of the Height of such Triangle, and the Base of the said Parabola will be equal to the Square Root of three times the Rectangle of the Segments of the Triangle's Base. Now, if BC

$$\left\{ \begin{array}{l} 75 \\ 70 \\ 65 \end{array} \right\} \text{ then will } NV = \left\{ \begin{array}{l} 42 \\ 45 \\ 48,46155 \end{array} \right\} \quad FE = \left\{ \begin{array}{l} 64,48256 \\ 58,0947 \\ 55,4565 \end{array} \right\}$$

$$\text{and the Area of the Parabola} = \left\{ \begin{array}{l} 1805,5114 \\ 1742,840 \\ 1791,677 \end{array} \right\} \quad \text{Hence it ap-}$$

pears, that the Base of the Parabola must stand upon the greatest Side of the Triangle.

The same answered by Mr. *Wm. Bevil of Harpswell*.

Let BA (see last Fig.) = a , AC = b , BC = c , AD = d , DC = f , BD = h ; also for VN the Abscissa put x ; SG = y ; then

per sim. Triangles $f : d :: y : \frac{dy}{f} = MS$. And by the Property of a Parabola $\frac{dy}{2f} : y^2 :: x : \frac{2fyx}{d} = NE^2$ the Sq. of the Ordinate:

And $h : f :: y : \frac{fy}{b} = HO$; again by sim. Δs , $h : d :: \frac{fy}{b} : \frac{dfy}{b^2} = OV$; and $\frac{dfy}{b} (OV) : \frac{fy}{b} (HO) :: \frac{dfy + 2h^2x}{2h^2} (RN) : \frac{dfy + 2h^2x}{2hd} = BN$. Also, $d : f :: \frac{dy + 2fx}{2f} (MN) : \frac{dy - 2fx}{2d} = DN$; or

$y = 2b - \frac{2hx}{d}$; which being put for y , in $\sqrt{\frac{2fyx}{d}} \times \frac{2x}{2}$

the Area of the Parabola, and thrown into Fluxions, we have

$3dx^2\dot{x} - 4x^3\dot{x} = 0$; whence $x = \frac{3d}{4} = 42$ the Abscissa of the

Parabola; and the Ordinate = $32,1277$: also $\frac{h}{2} = SG$, and $\frac{s}{2} = HO$, which is *universal*.

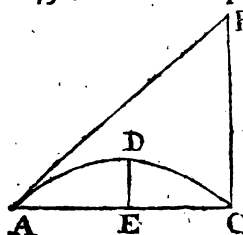
Nottinghamiensis observes, It is evident that let the Ratio of the Segments of the Base of the Triangle be what it will; the Altitude of the Parabola will still bear the same Proportion to that of the Triangle; because that Ratio being constant, can have no Effect on the *Minimum* relating to the Perpendicular: and because it is known that the greatest Triangle that will circumscribe a given Curve, will be when the Subtangent is equal to half the Altitude of the said Triangle; and because the Curve of a Parabola always divides the Subtangent into two equal Parts; it is evident that the Altitude of the Parabola will = $\frac{3}{4}$ of that of the Triangle; and its Ordinate = the sq. Root of the Rectangle of the Segments of the Base.

This Question was also truly solved by Mess. *Bamfield, Careless, Enefer, Gaskell, Kingston, Spicer*, and others, whose Solutions we cannot publish for want of Room.

10 Quest. (160) answered by Mr. S. Bamfield of Honiton, Dev.

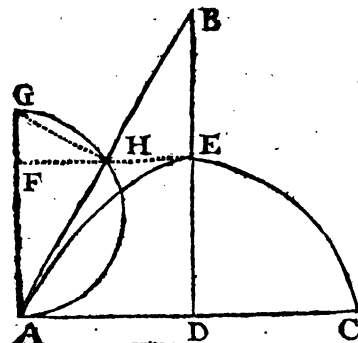
Put $x = \text{Sine } \angle BAC$, then $\sqrt{1-xx} = \text{Cof. } \angle B$; $r =$ the greatest horizontal Range, which is when the \angle of Elevation $= 45^\circ$; $b =$ the correspondent Height: *per* Laws of Projectiles

B say, $1 : (=s : \text{of double the } \angle \text{ of Elevation } 45^\circ) : r :: 2x\sqrt{1-xx} (=S. \text{ of double the } \angle BAC) : 2rx\sqrt{1-xx} = AC$. Again say, $1 : (= \text{versed Sine of double the } \angle 45^\circ) b :: 2xx (= \text{versed Sine of double the } \angle BAC) : 2bxx = DE$. $\therefore DE \times AC$ is to be a *Max.* which in Fluxions is $96rrbbx^5\dot{x} - 128rrbbx^7\dot{x} = 0$; reduced $x = \sqrt{\frac{3}{4}} = .86602 = \text{Sine of } 60^\circ$. *tere* = the Angle of Elevation required.



The same answered by Mr. W. Bevil of Hartswell.

If a Body be projected with a Velocity of d Feet in a second of Time, in a *non-resisting* Medium; and $p =$ the Feet descended by an heavy Body in that



Time, we have $\frac{d^2}{4p} = AG$

the Height the Body would ascend if shot directly upwards, for which Height put c ; Also let $x = \text{Sine } BAD$, the Angle of Elevation (and the Radius Unity) then *per* Trigonometry $1 : c :: x : cx = AH$; also $1 : cx :: x : cx^2 = AF = DE$; and (by 47

Eu. 1.) $cx\sqrt{1-x^2} = FH = \frac{1}{4}AC$; therefore $4c^2x^3\sqrt{1-x^2} \times \frac{1}{4} =$ the Area of the Curve, a *Maximum*; and in Fluxions is $6x^5\dot{x} - 8x^7\dot{x} = 0$. Whence $x = \sqrt{\frac{3}{4}} = .8660254 = 60^\circ$, the Angle required.

Mr. Josb. Holroyd of Lindley, near Huddersfield, solves it thus.

Let $f =$ Space a Body descends in a Second, $a =$ Velocity, and r and $c =$ Sine and Cof. of the Angle of Elevation: Then

by *Mechanics* $\frac{aasr}{f} =$ horizontal Distance; and $\frac{aasr}{4f} =$ Altitude of Projection; and $\frac{2a^4r^3c}{12f^2} =$ Area of the Curve; writing

$\sqrt{1-r^2}$

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$\sqrt{1-s^2}$ for s , its $\sqrt{4a^2s^6-4a^2s^4} = 2$ Maximum, in Fluxions is $24a^8s^5i-32a^8s^7i=0$. Reduced is $s=\sqrt{\frac{24}{32}} = \text{Sine of } 60^\circ$ or. = the Angle required.

[OBSERVATIONS, &c.] We received a great many different Solutions to the 7th Quest. last Year, from some of our most learned and ingenious Contributors, which did not agree with those inserted. (For instance) Mr. T. Garrard putting the Solidity of the Prism $= P$, $16\frac{1}{2}$ Feet $= cD =$ its Height, and $a =$ the Area of the Orifice ; by Emerson's Mechanics, p. 175. and

Fluxions, p. 110. gives $\frac{2P}{a\sqrt{2Dc}} = 10' 39'' 45''' =$ the Time sought, which agrees with the Solutions by Mess. Drury and Sharp.

Mr. Tho. Mofs *, by a Process founded on Sir Isaac Newton's Principia, gives $8' 10'' 19'''$ for the Time in which the Prism will empty itself. Mess. Bamfield, Charlton, Careless Jack, Donn, Gaskell, Holroyd, and Westman, bring out Conclusions the very same with those inserted.

Mr. Bevil in his Letter this Year, says, " In my humble Opinion, there is no true Answer inserted to Quest. 147 last Year. I answer it thus. Let $A =$ the Area of the Prism's Base in Inches, $c=10$, its Depth, $d=1\frac{1}{2}$

$= 7854$, $s=16\frac{1}{12} \times 12$, then $\frac{A}{dz a} \times \sqrt{\frac{a}{s}}$ will be $= 452,398295 = 7'$

$32'' 23'''$. which corresponds with the Answers inserted, and would be the true Time, was the Water to set out with the Velocity of the Discharge, from the Height of the Prism ; but it does not : Therefore according to Sir I. Newton we have $1 : \sqrt{2} :: 7' 32'' 23''' : 10' 39'' =$ the true Time of the Discharge."

As this Question has occasioned some Dispute, if any Gentleman, furnished with proper Apparatus, will please to try by Experiment, which of these Theories come nearest the Truth (as some Allowance must be made for Friction, Pressure of the Air, &c.) and favour us with his Observations, they shall be carefully and impartially published in this Diary.

E R R A T A.

DIARY 1755, P. 43. l. 8. for *Oculus*, r. *Æolus*. P. 44 and 45, for *W. Davis* r. *D. Davis*.

Diary 1756, p. 21. Lines 2, 3, and 4, for *b. r.* 6. P. 26. l. 10. for $+\frac{8a}{27}$, r. $-\frac{8a}{27}$. P. 30. l. 34. after Seconds, read then $\sqrt{193}$:

$341,05995 :: \sqrt{10} : 77,637$ the uniform Velocity per Second of the Water emptying itself, P. 34. l. 24. for *SDE* r. *SDC*. P. 43. for *Charles* r. *Christopher Mason*.

We once more return Thanks to our worthy Contributors for their kind Assistance and Encouragement ; and hope they will send us Things entirely new. And that they will draw their Schemes perfect, and of a proper Size for the Diary ; also that they will bring all their Equations out in Numbers ; and further, to send their Letters within the Time limited, &c. Nottingham, 2 June, 1756.

* If Mr. Mofs had not made an Oversight in his Numbers, his Solution (so far as it is founded on the Principia) would have agreed exactly with last Year's Answers ; the rest of his Process determines nothing.

38 New Mathematical Questions, 1756.

The following Eclipse of the Moon on July 30, 1757, which will be visible if Clouds interpose not, should have been inserted in the proper Place, if Mr. *Tho. Allen* of *Spalding* had favoured us with his Letter in Time; but (tho' it bears Date the 4th of May) we are willing to give it a Place here; in hopes that *be*, and all the rest of our Contributors, will for the future, take care to send their Letters, that they may come to Hand within the Time limited in the Advertisement.

His Calculation is as under:

	H.	D.	Sec.
Beginning at <i>Spalding</i> , 1757, July the 30th —	10	8	47 P.M.
Ecliptic Opposition — — —	11	34	25
Middle — — —	11	39	7
End — — —	13	9	27
Duration — — —	3	0	40
Digits eclipsed — — —	11	11	00

N.B. Mr. *Allen* has computed by Dr. *Halley's* Tables.

New MATHEMATICAL QUESTIONS proposed, to be answer'd in the next Year's Diary.

(1) Question 161 by Mr. *W. Smith* of *Irthlingborough*.

AT *Irthlingborough* in *Northamptonshire*,
 There dwells a virtuous Maid divinely fair;
 With Beauty, Wit, and Eloquence she's crown'd;
 And ev'ry lovely Grace in her is found!
 An Instance view *, then Artists make appear
 Her Name, in your fam'd *Diary* the next Year.

* As better Ideas are formed by visual Rays, than can be expressed by Words; we tell you, that her Christian Name is ELIZABETH, and her Surname consists of six Letters, having their Places in the Alphabet expressed by the Values of *v, u, w, x, y, and z*, in the following Equations †; by means whereof it may be discovered without any adjected Equation.

$$\begin{aligned} & \dagger \frac{x^2 + w^2 - zz^2}{2} \times \sqrt{x^2 - z^2} + z + x^3 = 282923,6 \text{ fere;} \\ & \frac{x^3 + z^3}{x + z} \cdot \frac{x - z^2}{2} - \frac{\sqrt{x - z}}{2} = 28,637 \text{ fere} \frac{wx - x^y}{2x} - \frac{wx - x^y}{2x} \\ & + \frac{wx - x^y}{2x}^{y-5} + \frac{wx - x^y}{2x}^{y-9} = 2184; \\ & \frac{v^6 u^4 - x^2 v^2 - z^3 v^2 + y^4 v^2 x w u^2}{v u w x y z} = 9913 \frac{1}{2} \frac{3}{8} \frac{5}{8}; \frac{v^6 u^5 w^4 x^3 y^2 z}{v u^2 w^3 x^4 y^5 z^6} \\ & = 15 \frac{1}{4} \frac{7}{8} \frac{2}{8} \frac{7}{8} \frac{9}{8} \frac{1}{8}; x = w. \end{aligned}$$

(2) Quest. 162, by Mr. *John Goodhead*, of *Nottingham*.

I'm in Love with a Damsel who has store of bright Gold
 In *Guineas* and *Moidores*; the Sum to unfold

Was

Was a difficult Task, that long puzzled my Brains,
But finding it out, I am put to more Pains :
Being now, by the fair one, requir'd to shew
The Number of *Guineas* and *Moidores* also.

Given $\begin{cases} xx + yy = a = 23401 \\ x^2 + y^2 + y^2 + x^2 = b = 124781 \end{cases}$ } Quere x and y with
the Investigation ?
 xx being = the Number of *Guineas*, and yy the Number of
Moidores.

(3) Quest. 163, by Mr. Cha. Mason of Sapperton, Gloucest.

In the Spring Quarter, Anno 1756, Day broke at Three, and
the *Sun's* Altitude that Morning when due East was $= 32^\circ 42'$;
required, where and when this happened ?

(4) Quest. 164, by Mr. Abr. Botham of Watnall, Nott.

Suppose a Ship set sail from a certain Place in Lat. $28^\circ 30'$
April 3, 1755, at Noon, and continues her Voyage on a great
Circle of the Sphere, at the uniform Motion of 4 Miles an Hour,
for 667 Hours, at which Time they perceive the Sun just rising:
Quere the Lat. she arrived at, 60 Miles being a Degree ?

(5) Quest. 165, by Mr. John Goodhead, Jun. of Nottingham.

A Gentleman having a Quantity of old fashioned Silver, is
desirous to convert the least Part of it possible into a *Punch*
Bowl, in form of a Solid generated by the Revolution of the
semicubical Parabola, to contain exactly four Pints; the Thick-
ness of the Metal, to be $\frac{1}{12}$ of an Inch: Quere the Dimensions
of the *Bowl*, and Quantity of Silver to make it? Also suppo-
sing the said *Bowl* to be filled with *Punch*, it is further re-
quired to find, at how many Glasses three modern *Mathemati-*
cians may empty it: The Glas being in the Form of the
Frustum of a Cone; whose less Diameter is x , the greater xx ;

Altitude $\frac{3x}{2}$; and Solidity xxx Inches?

(6) Quest. 166, by Mr. Tho. Allen, of Spalding, Linc.

Given, $ay^2 - \frac{yy^3}{x} - y^2y^2 - ay^2 = 0$. It is proposed to find
 x , in Terms of y ascending, independent of reverting any Series?

(7) Question 167, by Mr. Charles Wildbore of Nottingham.

Allowing the *Sun* to revolve about its Axis in 25 Days, 6
Hours; *Venus* (according to Signior Bianchini) in 24 Days, 8
Hours; the *Earth* in 23 Hours, 56 Min. the *Moon* in 27 Days,
7 Hours, 43 Min. *Mars* in one Day 40 Min. and *Jupiter* in
9 Hours, 56 Min. It is required to determine the *Ratio's* of
their greatest and least Diameters?

40 New Mathematical Questions, 1756.

(8) Question 168, by Mr. *Tho. Garrard* of *Ipswich*.

Suppose a Cistern in the Shape of a Parallelopipedon, has one supplying Cock, which alone would fill it in 10 Minutes : and three evacuating Cocks ; the first of which would empty it alone in 60 Minutes, the second in 80 Minutes, and the third in 120 Min. *Quere* in what Time would this Cistern be filled, if all the Cocks were set open together, by a general Theorem &c.

(9) Quest. 169, proposed by Mr. *Cha. Wildbore* of *Nottingham*.

In a certain Street in *Nottingham* there are three Lamps fixed (*viz.*) two A and B on one Side, and a third Lamp C, on the other : Now a Person being to pass along the said Street, is desirous to know the *Nature* and *Length* of the Track he must describe, so that he may be the least subject to be discerned : when the Distances AB, BC, and CA, are given = 34, 40, and 42 respectively : the Lamps A, B, and C, casting Light in the Proportion of 4, 5, and 6 ?

(10) Question 170, proposed by *Tabularius*.

Suppose a perfectly flexible Chain, 20 Inches long, to slide freely over two Pins, fixed in a Line parallel to the Horizon, so that the Curve formed thereby may rest in Equilibrio, with the Ends thereof hanging perpendicular from the Pins : it is proposed to determine the Lengths of the Curve and horizontal Line, when the given Chain is the shortest that will hang at Liberty over the Pins ; and also the Lengths of the two Curves which may be formed by the Chain, when the Pins are 7 Inches from each other ?

(11) Question 171, by Mr. *Tho. Moss* of *London*.

A lays 3 *Guineas* to 2 with B, that he throws, with three common Dice, a greater Number of Points at 4 Throws (or Trials only) than B can throw Heads, at 7 Throws, with 10 Halfpence ; and with this Restriction too, that if one Ace (or more than one) should happen to come up in any of the said Throws, none of the Points arising at such Throw (or Throws) shall be reckoned to A's Number. Now A's first Throw produced the three Duces, and in B's first Toss came up 7 Heads ; the former then desires his Antagonist (B) to draw the Wager : To find the Probability which B has of winning, and what he may expect to receive of A. to comply with his Request.

M. B. This should have been published last Year, but came too late, dated 7 May.

(12) Quest. 172, by Mr. *Charles Wildbore* of *Nottingham*.

A French Man of War, spying an *English* Frigate at a Distance, bore down upon it, and coming within half a Mile, saluted

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it with her chase Guns; which the *English* then, making all the Sail they were able, returned with broad Sides: in this Manner they bore away, with an uniform Celerity; (the Velocity of the *English* being to that of the *French* as 5 to 4) always keeping at the same Distance from each other, till the *French* were 10 Miles from the Place where the Chase began, when the *English* steer'd away, and the *French*, despairing to come up with them, gave over the Chase. Now it was observed that the *French* Ship described a semi-parabolic Curve, whose Abscissa is 8 Miles: it is required from hence to determine the Nature and Length of the Track described by the *English*?

(13) Question 173, by Mr. Tho. Allen.

Given $a^2x^2 = yx - xy^2 + cy^2$; to find the correct Equation of the Fluents by the *direct Method* of Fluxions only.

Answers to the ÆNIGMAS, in the last Year's Diary.

- | | |
|---------------------|------------------------|
| 1. The Letter G. | 5. ENVY. |
| 2. MAGGOT IN A NUT. | 6. A STROLLING PLAYER. |
| 3. A FIRE-SCREEN. | 7. A LOUSE. |
| 4. REASON. | 8. SOPHISTRY. |

Answers to the NOSE-GAY.

1. Sun-flower, 2. Honey-suckle, 3. Carnation, 4. Snow-drop, 5. Sweet-William, 6. Tube-rose, 7. Blue-bottle, 8. Jessamine, 9. Narcissus, 10. Star of Bethlehem, 11. Tulip, 12. Iris, 13. Globethistle, 14. Crown imperial, 15. Lark spur, 16. Hearts-ease, 17. Wall-flower, 18. Cow-slip, 19. Pheasants-eye, 20. Mary-gold, 21. Violet.

All the Ænigma's answered in Verse, by Mr. L. Charlton.

BRITONS! no more, while G**** illustrious reigns, 1.
 Let STROLLERS with *French* MAGGOTS fill your
 Brains: 6. 2.
 That haughty Crew with SOPHISTRY wou'd blind 8.
 The Powers of REASON, and corrupt the Mind! 4.
 Such VERMIN * may the Gauls for ever SCREEN; 7. 3.
 While ENVY'd Britain is of Isles the Queen! 5.

* Alluding to a Louse.

An Answer to all the Ænigmas, humbly inscribed to the fair but inexorable CÆLIA; by Mr. S. Bamfield of Honiton, Dev.

CÆLIA! Thou glorious but inconstant Maid,
 Why am I scorn'd!—Why ruin'd and betray'd?
 What, REASON's Charmer! Is't decreed above,
 That I must ENVY'd be by her I love?

4.
 5.
 Trod

42 Last Year's Ænigmas answer'd, 1757.

Trod like a WORM beneath thy pressing Feet ! 2.
 Yet scarce complain, and fearfully submit.
 How have I SCREEN'd thy beauteous Face from Sun; 3.
 What kind and humble Offices I've done!
 The Times we've STROLL'd, and PLAY'd, and joined Hands 6.
 In Hopes at length to join in *Hymen's* Bands.
 But Hopes are vanish'd—O thou cruel Fair!
 Lo! USE thy utmost Wrath, I'll not despair : 7.
 I'll CHEAT * the World, but I'll admitted be, 8.
 And will once more enjoy thy Company :
 Then, if thou wilt persist thy Swain to hate,
 I'll publish all thy Faults—thou most in GRATE ! 1.
 Will mock thy Pow'r, and scorn the haughty Maid
 Laugh at her Folly, and at all she's said.

Oh ! No, thou conquer'it still my yielding Heart;
 Thy bright Idea never can depart !
 Oh charming matchless CÆLIA !—smile once more :
 My all—my Soul is thine !—I thee adore !
 If thou still frown—I'll seek th' oblivious Grave,
 And please myself, I dy'd thy wounded Slave.

* Alluding to *Sophistry*.

Mr. Cha. Underwood of Bath, solves all the Ænigmas and NOSE-GAY, as follows ; in Remembrance of a pleasant Walk in a Gentleman's * GARDEN. (N. B. The Nose-gay only is *Italic*) * I.

Within this silent Wilderness,
 What *Sunflowers* here abound ! 1.
 Here little Birds fly to their Nests ;
 And *Violets* deck the Ground. 21.
 See ! how the Spring, so gradually
 Enlivens all our Shades :
 When Frost, and *Snow-drops* from
 it fly, 4.
Cow-slips adorn the Meads. 18.
 The *Iris*, and the *Jessamine* ; 12. 8.
Carnation and *Tube-Rose*, 3. 6.
 While NUT-trees, *Tulips*, and the
 Vine, 11. 11.
 And *Wall-flowers* greet your
 Nose. 17
 The *Lark-spur*, and the *Mary-gold*,
 15. 20.
 And *Star of Betshem* high ; 10.
 With *Crown Imperial* glorious Mold,
 14.
 Illumes the *Pheasants-Eye*. 19.

Sweet - *Williams* and the *Honey-*
suckle, 5. 2.
 And Scotland's *Thistle-Ball* ; 13.
 The *Narcissus* and *Blue-Bottle* : 9. 7.
 Are Love's and *Hearts-ease* all. 16.
 See how these Plants by Nature join,
 To yield us Pleasure here :
 No Hate nor ENVY they design, V.
 But flourish without Fear.
 But, ah ! the Man that spends his Days
 In trifling by the FIRE * ; III.
 Whose chief Delight's in Balls and
 PLAYS, VI.
 Nor REASON does admire, IV.
 He's like the Man that builds his
 'House,
 SOPHISTER like on Sand VIII.
 Whose Fortitude is (like a LOUSE) VII.
 Destroy'd by th' weakest Hand.

* Alluding to the Fire-screen.

All

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All the *Ænigmas* answered in a new *Ænigma* proposed for next
Year (1) *Ænig.* 115, by *Random Junior*.

Of Children *ten* born at one Birth
But *one* resembles me,
Nor are two Creatures on the Earth
More intimate than *we* :
Yet such my Lot that when *this* Brother
Takes *one* Side, I must take the
other.
For *ENVY* I have *REASON* none, 5.4.
Unless *this* may be Matter ;
That of *ten* Brethren only *one*
Is low as me in Stature.
A Namesake formerly I had,
Well known to Young and Old ;
And many a merry Prank he play'd,
Which often has been told.

He *STROLL*'d about, made famous
Sport, 6.
As *Hist'ry* does determine ;
And often was employ'd at Court,
Whilst I was killinG *VER-*
MINE *. 1.7.
He was indeed a busy Whelp,
I am not useless quite ;
The Hungry I to Food do help,
And *SOPHISTER* do write. 8.
More has been said than need have
To indicate my Name : [been,
Now *crack* the *NUT*, take off the
SCREEN ; 2.3.
And tell me who I am.
* Alluding to a *Louise*.

All the *Ænigmas* answered by *Tho. Peat*, in an *Elegy* occasioned by the Death of the late worthy and ingenious Mr. *John Badder* ; who for sixteen Years past was a *Proprietor* in this *Diary*. He died at *Cossall* near *Nottingham*, on *Sunday, Feb. 22, 1756*.

Ah, *Geni's*—He's dead ! come mourn, lament with me, }
There's *REASON* good—sure Greater cannot be ! } 4.1.
Badder to *WORMS* and *Dust*, is now a *Præy* ! } 2.
Oh ! *SCREEN* his hallow'd *Tomb* from Feet prophane ! 3.
Nor let a *STROLLING PLAYER*, nor the *Vain*, 6.
With *ENVY*, *SOPHISTRY*, and *LOUSY Cant* ; 5. 8. 7.
Nor carping *Momus* know ; how much I want
Of his great *Genius*, *Knowledge*, *Parts*, *Affluence* ;
(But, to that awful *Call* there's no *Resistance* !)
Oh ! may I, whilst I here abide inherit
His, as *Elisha* did *Elijah's* Spirit.

All the *Ænigmas* answer'd by Mr. *Cha. Wildbore* of *Nottingham*.

Death's sure and common, both to Small and Great ; 1.
We are but *PLAYERS* in our present State. 6.
But, in the happy Regions above,
There's nothing found but *Harmony* and *Love* !
O'er those blest'd Plains, thy *Shade*, O *BADDER*, roves,
By crystal *Rills*, and ever blooming *Groves* :
There thou may'st muse, and spend thy happy *Hours*,
With *REASON* just, in *Amaranthine* *Bow'rs* ! 4.
Where never-dying *Birds* for ever sing,
And *Flowers* do bloom in an eternal *Spring* :

There

44 New Ænigmas to be answer'd next Year.

There Joy and Happiness attend the Bless'd
 Here, SOPHISTRY, and LOUSE-like ENVY rest; 8. 7. 5.
 And nought but Cares and MAGGOTS fill our Brain, 2.
 To SCREEN ourselves from Poverty and Pain: 3.
 Then why so fond of Life! Why shou'd Mankind,
 Prefer to Happiness, this World of Wind?

N. B. *The Question concerning the Oak and Ivy (sent us by a Gentleman whom we should be very sorry to disoblige) would have justly merited a Place: But as we find it was published in the Ladies Diary, 1737, and answered in the same, in 1738, by Mr. Lycet, the Proposer, and by Mr. Emerson, we chuse to omit it.*

New Ænigmas to be answer'd in the next Year's Diary.

(2) Ænig. 116, by Mr. Tim. Drury of Great Houghton, Yorksh.

WITH Brutes of various Kinds, and Men I'm seen,
 But seldom I have with the Ladies been;
 For if rude Nature e'er it so ordain,
 Then I do quickly meet your high Disdain.
 In ancient Times how greatly was I bless'd!
 I was by Patriarchs and Kings caress'd:
 Honours (almost divine) were to me paid,
 And Men of all Degrees implor'd my Aid;
 Then, to my Name some Rev'rence was allow'd:
 And I with *Quantum sufficit* endow'd:
 But now alas! I bear but small Esteem,
 My former Grandeur's thought an idle Dream;
 I'm cut and mangled, and oft-times am made
 To stand the Rage of many a sturdy Blade:
 Howe'er, this Comfort there is still for me
 Not Time, nor Place can quite demolish Me;
 In spite of ev'ry Scoundrel's Disgrace,
 Altho' they do accuse me to my Face;
 Yet, I their Taunts and Subtilties despise,
 For (Palm-tree like) depress'd, the more I rise.

(3) Ænigma 117, by Mr. J. Noorthouck of Watford.

I, of ten Brethren, all well known, am not the least esteem'd;
 Tho' one we scarcely chuse to own, as he is *spurious* deem'd.
 In Ages dark, when *Augury*, *Magic* and *Divination*
 The *Craft of Knaves* was own'd by Fools, I got great Reputation;
 Scarce any Trick was then perform'd, by Rogues of *Understanding*,
 To awe and *steece* a slavish Herd, but what I had a *Hand* in.
 And where their Relicks still survive, I still maintain my Bounds;
 I have an Hand in *Ague Charms*, and eke in *Coffee Grounds*.
 Propitious I am always thought, by ev'ry Nurse and Maid,
 Since Witches, Fairies, Imps, and Sprites, are by my Power laid.

Thus

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Thus much for Folly ; now proceed to Things acknowledg'd true,
 And first, all pious godly Men have chiefly *me* in View !
 The Pope, who no Superior owns, brimful of priestly Pride ;
 Forgets that I in all his Pomp, on him triumphant ride.
 When two Companions o'er a Pot, for Conversation meet ;
 Without my Help their Mirth will not be lively nor compleat !
 In Trade and Science I excel ; for much depends on *me* ;
 As now it does on you to tell my Name, and what I be.

(4) Ænigma 118, by Mr. Cha. Underwood of Bath.

I, from a noble Sense derive, thro' Care and Tribulation ;
 But, being never known to thrive, must suffer Destination.
 No Hand or Feet have I at all, yet am no sooner born,
 But run on till I have a Fall, and then am left forlorn !
 With Laughter I sometimes am seen (tho' to each other strange)
 And sometimes in the Play-house am, yet like the Scenes I change.
 I own my Time is here but short ; yet they that sown me ;
 Shall never be forsaken for't, but ever blest'd shall be !

(5) Ænigma 119, by Mr. John Haycraft.

A Thing more strange, I think you'll Most People never knew, [say, A Thing of so much use as I ; And less than nothing too. Yet at my Name, some break their And others do run mad : [Hearts, I'm worse to some than fiery Darts, Whilst others I make glad. I frequent am in most Discourse, In Truth and Lying too ;	In Work and Play, both Night and Day, But chiefly when you woo. In seeking what I am, no doubt, You'll often hear me nam'd, And if by chance you find me out, You're worthy to be fam'd. " So seek and find me if you can, " What is my Name, and who I am.
---	---

(6) Ænigma 120, by Random Junier.

Ere I arrive at State mature, I various Tortures must endure ; Am cut, bound, beaten and confin'd, And made the Sport of every Wind ! Yet, tho' with Patience these I bear, Am doom'd to Pains still more severe ; Which I, by Turns, am made to feel, By Fire, and Water, and the Wheel ; Am scalded <i>bitterly</i> ! And then Scourg'd until I <i>foam</i> again ; Unable to bear more ! What wonder If Body now and Spirit sunder ? The grosser Part returns to clay, To Birds, to Beasts, and Fish a Prey ; The Spirit, e'er its perfect Glory A while confin'd in Purgatory ; But, after due <i>Purgation</i> , when	My Liberty, I get again, A full Revenge to me belongs To compensate my former Wrongs ; For, I shall surely be to the Man That makes too free with me a Demon. But, those who use me well shall find In me a cheerful Friend and kind. I'm to the Crown a Friend most hearty Tho' equally I serve each Party ; And tho' I seldom stir from Home, Yet, at Elections out I come ; Into the publick Streets I venture, Of all the Mob myself the Centre ! Headed by me, as one who is Chief They perpetrate all Kind of Mischief. My Riddle in two Points is wrong, 'Tis much too easy, and too long.
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(7) Ænigma 121, by Mr. Cha. Wildbere.

In dormant Non existence had I slept
 It had been better for the Sons of Men !

46 New Ænigmas to be answer'd next Year.

In geometric Form, with checquer'd Pavements,
 A stately Dome on the Outside I seem;
 But, when I ope my Portals, and display
 Unto Mankind my *Inside*, straight appear
 Two Armies blended: but they soon assume
 Each one his Post, in regular Array.
 Plac'd in two open *Forums* which are parted
 Much like the Sons of *Europe* and of *Afric*.
 Yet, they the Pest of Learning may be call'd,
 Th'Army of Fiends, and Jubilee of Hell!
 These plac'd; then there descends like Clap of Thunder
 The two *Catchpoles* of the infernal Regions!
 Two spotted Demons—Gods of Atheism,
 And wait the Fate of those embattled Armies,
 As *Scipio* (of old) and *Hannibal* in *Afric*
 Did weigh the Fate of ancient *Rome* and *Carthage*,
 So by them *Sharppers* weigh the Fate of Fools!

Within my Bowels (in myself) I'm harmless,
 Nor Mischief do without the Aid of Man.
 Then, Sons of Folly, of my Wiles beware;
 For Friendship I can quickly turn to Hatred,
 And Affluence to pining Poverty.

And now I hope (so very plain 'tis wrote)
 You need not twice be ask'd what is my Name.

(8) Ænigma 122, by *A gray Mongrel Cur*.

Of all Things I'm most priz'd, but most abus'd;
 Am sometimes short, and oft (when long) ill us'd:
 But, be that as it will, I'm still approv'd,
 Desir'd, and much esteem'd: by all belov'd!
 The *King*, the *Boor*, the sage *Philosopher*,
 Nay even *Brutes* 'bove all Things me prefer:
 For me all Hazards run, and for my Sake,
 Will venture their whole All, if 't lies at Stake!
 Yet notwithstanding, what I've said is true,
 Numberless Enemies do me pursue;
 In various Shapes and in unknown Disguise
 Dissembling; and sometimes to the Surprise
 Of all By-standers, I am snatch'd away,
 From those who fondest were of me---Then say,
 What am I?—Who have *ev'ry one* my Friend,
 And yet one Enemy will be my End!
 End, did I say! Yes---sure as you're a Man,
 You like, you love me---keep me if you can.

(9) Ænigma 123, by Mr. *James Hall*.

'Tis true I am no Scholar, Sages,
 Nor am I read in classic Pages,

Yet

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Yet oft am seen in grave Disguise,
With *Egypt's* Fogs before my Eyes,
Soothing the Fates unwelcome Blister,
The happy Event of a Tester.
I'm Contradiction quite all o'er,
Stoic as well as *Epicure*;
I'm green as Grass near crystal Streams,
White as the Swans on silver *Thames*;
Yellow as Wax, and yet you'll own,
I'm always dress'd in Ruffet brown.
I'm hard and rough, yet smooth and fair,
Soft as the Furrs of *Russian* Bear;
Sweet as the Honey-sweet, inviting,
Charming, pleasant, rich, delighting;
And yet, most nauseous and untoothsome,
Distasteful, bitter, harsh, and loathsome.

This well sets forth the Scene of Life;
What, Three to One! (unequal Strife)
Three Hardships! See to Honour's Prize,
The Way thro' rugged Virtuelies.

My Fate's more strange (you'll scarce believe)
First stript! next rackt! then flea'd alive!
What Tortures! biting! pinching! stoning!
'Tis well if I escape from drowning!
Last suffer *Jonah's* Fate—d'ye hear it?
Pity me, since for you I bear it:
Not out of Hate, but just to prove
The mere Extremity of Love.
Excuse me, Sages, now for Shame,
There's nothing wanting but—my Name.

(10) Ænigma 124, by Mr. *John Pickburn*.

When the vast Fabrick of the Heav'ns was made,
The Skies unfurl'd and Earth's Foundation laid,
In Nature's earliest Age I took my Birth,
And spread my Empire round the spacious Earth,
The Beasts, and Birds, and Fish that cleave the Sea
Confess my regal Pow'r, and all obey;
And tho' Mankind sometimes with me contends,
Few are my Foes while Thousands are my Friends.
Nor is it strange, since human Beings are,
The constant Objects of my friendly Care.
I'm the Procurer of Content and Peace,
Possess of me a Man may live at Ease;
May bear with Patience all the broken Vows,
And the Misconduct of a wanton Spouse.

By

By my Assistance Lawyers gain their End,
Nor can the Parson boast a better Friend.
I often in judicial Courts appear,
And save whom awful Justice would not spare;
I find Employment too amongst the Great,
In divers Matters which concern the State;
When Generals take the Field in Honour's Cause,
And hazard Life, in search of vain Applause;
While Thousands fall by slaughter'ring Sword and Gun,
Oft by my Aid the Battle's lost or won.
Thus have I, thro' the Course of all my Days,
Befriended Man a thousand different Ways;
Giv'n Wealth and Ease to some, to others Fame,
Then in Return be pleas'd to tell my Name;
Which, by these obvious Hints, you'll quickly find,
For, right or wrong, you bear me in your Mind.

An Alphabetical Catalogue of Contributors to this Diary;

The Fig. 1, 2, 3, &c. shewing the Questions, the Numerical Letters i, ii, &c. the Ænig. and N. the Nofegay of Flowers each answered.

MR Tho. Allen 1st Letter with Solutions &c. never came to Hand, but we received two others with 2 Q. prop. and the Ecl. Mr Rich. Abbot all Æ. but v. viii. Mr Anth. Arch all Æ. and N. Angelica all Æ. Mr Ab. Botham 3, 5, 7, 8, 10. i, iii, iv, v, vii. N. prop. 1 Q. Mr Sam. Bamfield all Q. all Æ. in Ver. Mr Wm Bevil 1, 5, 6, 8, 9, 10. Mr John Boston 5, 10. i, iv, vii. Miss Bridget all Æ. Mr Jos. Briscall 1, 5, 10. all Æ. N. Mr Bright all Æ. Mr Lionel Charlton all Q. but 4. all Æ. in Ver. N. and Mr Cooks Q. Mr T. Corbit i, v, vii. N. prop. N. Jack Careless 8, 9, 10, Ecl. Mr Tim. Drury 5, 6, 7. i, iv, v, vi, vii. prop. 1 Q. and 1 Æ. Mr Luke Elstob i, vii. prop. 1 Q. 1 P. Ecl. &c. Mr Wm. Eneser all but 1 and 6. Miss Enfield all Æ. Mr Tho. Fletcher 3, all but ii, vi, and viii. Fructuarius N. prop. 2 Desert after the same Manner as the N. last Year. Mr Tho. Garrard all Q. prop. 2 Q. Mr Zach. Gaskell all Q. Mr Edw. Greensted Ecl. Mr Tho. Grimes 2, 4. i, ii, vii. Mr John Goodhead Jun. prop. 2 Q. Mr Tho. Hare 3, 5, 10. i, ii, iv, vi, vii. Mr Joshua Helrcyd 3, 4, 5, 7, 8, 10. i, iv, v, vii. Mr Jacob Hill all Q. Mr Kingston all Q. all Æ. N. prop. 1 Q. Mr Rob. Marth all Æ. but iii, & viii. N. in Ver. F. F. Mingle i, ii, iv, v, vii. prop. 1 Æ. Mr Cha. Mason 3, 5, 6, 8. prop. 1 Q. Mongrel Cur P. 1 Æ. Mr J. Noerthouck all but vi, viii. N. prop. 1 Æ. Mr Tho. Peat all Æ. in V. Mr Geo. Rebus all Æ. but 3. prop. 1 Q. Mr Alex. Row prop. 2 Q. 1 Æ. Random Junior all Æ. prop. 2 Æ. Mr Geo. Salmon i, iii, iv, v, vii. Miss Sophia prop. 2 Q. 1 Æ. all modestly taken from our own Sup. &c. Mr Wm Smith 5, 10. i, ii, iii, iv, vii. N. prop. 1 Q. Harmon Sanctus 2, 4, 5. Mr Wm Spicer 3, 5, 6, 7, 8, 9. p. 1 Q. Mr Wm Swift ii, iv, v, vi, vii. prop. 1 Æ. 1 P. N. Tabularius 1, 3, 5, 6, 7, 8, 9, 10. prop. 1 Q. Mr John Thompson 5, 6, 8. prop. 1 Q. Mr Cha. Underwood all but iv and viii. in V. prop. 1 Æ. N. in V. Mr Cha. Wildbere all Q. all Æ. N. Mr H. Weetman 2, 7. Wifecre all Æ. N. prop. N.

The LADIES' *Diary*:

OR Woman's ALMANACK,

For the YEAR of our LORD 1757.
Being the First after BISSEXTILE, or LEAP-YEAR.

Containing New Improvements in ARTS and SCIENCES,
And many Entertaining PARTICULARS;
Adapted for the *Use* and *Diverſion* of the

FAIR-SEX.

Being the Fifty-Fourth ALMANACK Publish'd of this Kind.



Ye Happy FAIR, whom Sacred *Reason* transports fire,
Accept, propitious, what Your Selves inspire:
For YOU the MUSE her kindest Influence lends,
And SCIENCE wide its ample Bounds extends.
Alike your FORM and WIT resistless Charm,
With LOVE and VIRTUE ev'ry Bosom Warm.

Printed by *A. Wilde*, for the Company of STATIONERS, 1757.

A CHRONOLOGY of Remarkable Events.

Y. of Christ	Years since	Y. of Christ	Years since
1600	KING Charles I. Born — 157	1702	K. Wil. died, and Q. Anne suc. 53
1603	Q. Elizabeth Died, and King James Succeeded — 154	1702	War against France declared — 55
1603	A great Plague in London — 154	1703	Terrible Wind, Nov. 26 — 54
1605	Popish Gun-powder Plot — 152	1704	Gibraltar taken — — 53
1625	K. James died, & K. Ch. suc. 132	1704	French beat at Hochstet — 53
1641	Bloody Irish Massacre — 116	1706	French beat at Ramellies — 51
1642	Edgehill Fight — — 115	1707	England and Scotland United 50
1643	Newbury Fight — — 114	1708	French beat at Oudenard — 49
1644	Marston-Moor Fight — 113	1709	French beat at Blarequies — 48
1645	Battle of Naseby — — 112	1713	Peace with France Proclaim'd 44
1649	King Charles I. Beheaded 108	1714	Queen Anne Died, and King George I. Succeeded — 43
1651	Fight of Worcester — — 106	1716	Rebellion in the North — 41
1658	Oliver Cromwell died — — 99	1716	Very great Frost — — 41
1660	King Charles II. Restored — 97	1727	King George I. Died, and King George II. Succeeded 30
1665	Last great Plague in London, 3 whereof died 68,586 Persons 92	1739	Last Great Frost — — 18
1666	Great Fire in London — — 91	1739	War against Spain declared — 18
1685	King Charles II. Died, and 3 King James II. Succeeded 72	1742	A great Comet appeared — 15
1685	Duke of Monmouth Beheaded 72	1744	War against France declared 13
1688	Prince of Orange Landed — 69	1745	Rebellion in Scotland — — 12
1688	King James II. Abdicated — 69	1748	General Peace — — 9
1689	K. Wil. and Q. Mary crown'd 68	1752	The New Style first used in England — — — 5

BIRTH-DAYS of the ROYAL-FAMILY of Great-Britain [New Style.]

KING GEORGE II. Born, 1683	Ps. Augusta Born, Aug. 11, — 1737
November 9 — — — 1683	P. Edward, March 25, — — 1739
P. of Wales, June 4, — — 1738	Ps. Elizabeth, Jan. 10, — — 1740
Ps. of Orange, Nov. 2, — — 1709	P. William Henry, Nov. 25, — 1743
Ps. Amelia, June 10, — — 1711	P. Henry Frederick, Nov. 7, — 1745
Ps. Caroline, June 10, — — 1713	Ps. Louisa Anne, March 19, — 1749
Ps. Dow. of Wales, Nov. 30, 1719	P. Fred. William, May 24, — 1750
Duke of Cumberland, April 26, 1721	Ps. Caroline Matilda, July 22, 1751
Mary, Ps. of Hesse, March 5, 1722	

YEARS of the Birth of the Principal Sovereign PRINCES in EUROPE.

Francis, Emp. of Germ. Born, 1708	Emanuel, King of Portugal, Born, 1714
Maria Theresa, Emp. Queen, 1717	Chs. Frederick, K. of Prussia, — 1712
Elizabeth, Empress of Russia, — 1709	Frederick Augustus, K. of Poland, 1696
Lewis XV. K. of France, — 1710	Charles Emanuel, K. of Sardinia, 1701
Ferdinand, K. of Spain, — 1713	Don Carlos, K. of the Two Sicilies, 1716
Adolphus Fred. K. of Sweden, 1710	Benedict XIV. Pope, — — 1675
Frederick, K. of Denmark, — 1723	Osman III. Grand Signor, — 1698

1757. January hath XXXI Days.

Full Moon, the 5th Day, at Noon
 Last Quarter, the 13th, at 10 Morn.
 New Moon, the 20th, 21 m. past 2 Morn
 First Quarter, 27th, 58 m. past 1 Morn.

Sun enters ∞
 19th. 6 h. 13 m.
 Apparent Time.

1	S	Circumcision: Or, New-	8	43	56	23	0	3	M	55	1	4
2	B	2 S. aft. Christ. [Year's-D.		4	56	22	54	4	57		5	5
3	M			3	57		48	5	56		6	6
4	T			2	58		42	6	50	2	0	0
5	W	Old CHRIST-MASS-DAY		1	59		35	7	rises		1	1
6	T	Epiphany: Twelfth Day		0	4	0	28	5	A	15	2	2
7	F		7	59	1		20	6	13		3	3
8	S	Lucian, Pr. and Martyr		58	2		12	7	19		4	4
9	B	1 Sunday after Epiphany		57	3		4	8	24		5	5
10	M	Princess Elizabeth Born		56	4	21	56	9	30		6	6
11	T			55	5		45	10	38	3	0	0
12	W			54	6		35	11	50		1	1
13	T	Hilary		53	7		25	Morn.			2	2
14	F	Oxford and Camb. Term		52	8		14	1			3	3
15	S	[Begins		51	9		3	2	15		4	4
16	B	2 Sunday after Epiphany		50	10	20	52	3	32		5	5
17	M	Old Twelfth-Day		49	11		40	4	44		6	6
18	T	Prisca, Martyr		48	13		28	5	55	4	0	0
19	W			46	14		15	6	55		1	1
20	T	Fabian. In eight Days of		44	15		2	7	sets		2	2
21	F	Agnes. [St. Hilary 1 Ret.		43	17	19	49	6	A	20	0	1
22	S	Vincent, Martyr		42	18		35	7	44		2	2
23	B	3 Sun. aft. Epiph. Hilary		41	20		21	8	58		3	3
24	M	[Term Begins		39	21		6	10	13		4	4
25	T	Conversion of St. PAUL		37	23	18	51	11	22		5	5
26	W			36	25		36	12	15		6	6
27	T	From the Day of St. Hil.		34	26		21	Morn.		1	0	0
28	F	[in 18 Days, 2 Returns		32	28		5	1	36		1	1
29	S			30	30	17	49	2	40		2	2
30	B	K. CHARLES I. Martyr'd		28	32		32	3	39		3	3
31	M			27	33		15	4	38		4	4

Days L. of D.			Day Inc.	D. breaks	Sun East.	Tw. ends	C bef. S.	7 Stars So.							
1	7	52	0	8	5	59	4	41	6	1	4	22	8	A	42
6	8	0		16		57		43		3		6			20
11		10		26		53		46		7		8			58
16		20		37		49		49		11		10			37
21		34		50		44		53		16		12			26
26		49	1	5		38		57		22		13			54

1757. February hath XXVIII Days.

Full Moon, 4th, 30 m. past 7 Morn.
 Last Quarter, 11th, 32 m. past 8 Night
 New Moon, 18th, 28 m. past 1 Aftern.
 First Quarter, 25th, 12 m. past 8 Night

Sun enters ♈
 17th. 21 h. 5 m.
 Apparent Time.

W	Sundays, Holidays, &c.	Sun rises	Sun sets	Sun's Decl.	☾ rises & sets	☾ A. W.D.
1 T		7 26	4 35	16 58	5 27	1 5
2 W	Purif. or, Candlemas-Day	24	37	41	6 8	6
3 T	On the morrow of the Pur.	22	39	25	6 46	2 0
4 F	[3 Returns	20	40	5	☾ rises	1
5 S	Agatha, Martyr	18	42	15 47	6 A 5	2
6 B	Septuagesima Sunday	16	44	28	7 15	3
7 M		14	46	10	8 24	4
8 T		12	48	14 51	9 32	5
9 W		11	49	30	10 44	6
10 T	In 8 days of the Purificat.	10	51	12	11 55	3 0
11 F	[4 Ret.	8	53	13 52	Morn.	1
12 S	TERM Ends.	6	55	32	1 11	2
13 B	Sexages. Old Cand. Day	5	56	12	2 23	3
14 M	Valentine, Bp. and Martyr	3	58	12 51	3 34	4
15 T		1	5	0	4 36	5
16 W		6 59	2	10	5 31	6
17 T		57	4 11	49	6 16	4 0
18 F		55	6	28	☾ sets	1
19 S		53	8	6	6 A 28	0 1
20 B	Shrove-Sund. Quinquag.	51	10 10	45	7 45	2
21 M		49	12	23	9 1	3
22 T	Shrove-Tuesday	47	14	1	10 14	4
23 W	Ash-Wednesday	45	16	9 39	11 24	5
24 T	St. MATTHIAS	43	18	17	12 29	6
25 F		41	20	8 55	Morn.	1 0
26 S		39	22	32	1 31	1
27 B	Quadrag. 1 Sun in Lent	38	23	10	2 29	2
28 M		36	25	7 47	3 20	3

Days	L. of D.	Day incr.	D. breaks	Sun East.	Tw. ends.	Clo. bef. S.	7 Stars So.
1	9 9	1 25	5 30	5 4	6 30	14 14	6 A 31
6	27	43	22	9	38	41	10
11	45	2 1	14	15	46	46	5 50
16	10 3	19	6	20	55	34	31
21	23	39	4 57	26	7 4	3	12
26	43	59	48	32	13	13 17	4 53

1757. March hath XXXI Days.

Full Moon, 5th, 17 m. past Midnight
 Last Quarter, 13th, 35 m. past 4 Morn.
 New Moon, 20th, 9 m. before 1 Morn.
 First Quarter, 27th, 5 m. past 4 Aftern.

Sun enters
 19th. 21 h. 4
 Apparent Tir

1	T	David, Abp. of Minevia	5	34	5	27	7	24	4	4
2	W	Ember Week		32		29		1	4	49
3	T			30		31	6	38	5	25
4	F			28		33		15	5	55
5	S	Princes of HESSE Born		26		35	5	52	7	rises
6	B	2 Sunday in Lent		24		37		29	6	16
7	M	Perpetua		22		39		6	7	25
8	T			20		41	4	42	8	38
9	W			18		43		19	9	53
10	T			16		45	3	55	11	8
11	F			14		47		32	12	18
12	S	Gregory		12		49		8	Morn.	
13	B	3 Sunday in Lent		10		51	2	44	1	29
14	M			8		53		21	2	35
15	T			6		55	1	57	3	31
16	W			4		57		33	4	17
17	T	St. Patrick		2		59		10	4	59
18	F	Edward		0	6	1	0	46	5	30
19	S	[Cuthbert]	5	58		3		22	6	2
20	B	4 S. in Lent. Midlent Sun.		56		5	0	N 2	7	sets
21	M	Benedict		54		7		25	7	A 96
22	T	Pr. & Cam. Terms End		52		9		49	9	11
23	W			50		11	1	12	10	20
24	T			48		13		36	11	25
25	F	LADY-DAY. Pr. Ed. B.		46		15	2	0	12	27
26	S			44		17		23	Morn.	
27	B	5 Sunday in Lent		43		18		47	1	22
28	M			41		20	3	10	2	12
29	T			39		22		33	2	58
30	W			37		24		57	3	33
31	T			35		26	4	20	4	5

Days	L. of D.	Day incr.	D. breaks		Sun	East.	Tw.	ends	Clo.	bef. S.	7 St.		
1	10	53	3	9	4	43	5	36	7	18	12	42	4
6	11	13		29		32		42		29	11	35	
11		33		49		21		48		40	10	16	
16		53	4	9		14		55		50	8	50	3
21	2	13		29		0	6	1	8	1	7	20	
26		33		48	3	48				12	5	47	

1757. April hath XXX Days.

Full Moon, 4th, 52 m. past 1 Aftern.
 Last Quarter, 11th, 6 m. before Noon
 New Moon, 18th, 31 m. past Noon
 First Quarter, 26th, 4 m. past Noon

Sun enters ♈
 19th. 10h. 49 m.
 Apparent Time.

1	F		5	33	6	28	4	43	4	34	1	5
2	S	[of Chick.	31	30		5	6		5	0		6
3	B	Palm-Sund. Richard, Bp.	29	32		29	5	24	2			0
4	M	St. Ambrose, Bp. of Mil.	27	34		52	3	rises				1
5	T	Old LADY-DAY	25	36	6	15	7A	46				2
6	W		23	38		37	9	2				3
7	T	Maundy-Thursdai	21	40	7	0	10	19				4
8	F	GOOD-FRIDAY	19	42		22	11	29				5
9	S		17	44		45	12	36				6
10	B	EASTER-DAY	15	46	8	7	Morn.	3				0
11	M	Easter-Monday	13	48		29	1	34				1
12	T	Easter-Tuesday	11	50		51	2	25				2
13	W		10	51	9	13	3	5				3
14	T		8	53		34	3	41				4
15	F		6	55		56	4	10				5
16	S		4	57	10	17	4	37				6
17	B	1 Sun. aft. East. Low-Sun.	2	59		38	5	24				0
18	M		0	7	1	59		fets				1
19	T	Alphage.	4	58	3	11	20	8 A 7	0			1
20	W	Dr. & Cam. Terms Beg.	56	5		40	9	17				2
21	T		54	7	12	1	10	21				3
22	F		52	9		21	11	21				4
23	S	St. GEORGE, Martyr	50	10		41	12	14				5
24	B	2 Sunday after Easter	49	12	13	1	Morn.					6
25	M	St. MARK, Evangelist	47	14		20	0	59	1			0
26	T	Duke of Camberland Born	45	16		39	1	37				1
27	W	Easter TERM Begins	43	18		59	2	12				2
28	T		41	20	14	18	2	39				3
29	F		40	21		36	3	8				4
30	S		38	22		55	3	34				5

Days	L. of D.	Day Inc.	D. breaks	Sun East	Tw. ends	C. bef. S	Stars So.								
1	12	55	5	11	3	33	6	25	8	28	3	58	2	A	49
6	13	15		31		20		21		41		2	24		31
11		35		51		6		27		55		0	5		12
16		53	6	9	2	54		33	9	7		19		1	54
21	14	13		29		40		39		21		1	28		35
26		31		47		23		44		38		2	25		16

1757. May hath XXXI Days.

Full Moon, the 3d, 22 m. past Midnight
 Last Quarter, the 10th, at 6 in the Even.
 New Moon, the 18th, 9 m. past 1 Morn.
 First Quarter, 26th, 38 m. past 5 Morn.

Sun enters 11
 20th. 11 h. 46 m
 Apparent Time.

1	B	3	S. aft. East. St. Phil. & Jac.	4	36	7	25	15	13	3	55	1	6
2	M		From the Day of East. in 3		34		27		31	4	21	2	C
3	T		Invent. of + [W. 2 Ret.		33		28		48	4	46		1
4	W				31		30	16	6		rise		2
5	T				30		31		23	9	17		3
6	F				28		33		40	10	32		4
7	S				26		35		56	11	37		5
8	B	4	Sunday after Easter		25		36	17	13	12	30		6
9	M		From the Day of Easter in		23		38		29	Morn.		3	0
10	T		[1 Month, 3 Returns		22		39		44	1	14		1
11	W				20		41	18	0	1	49		2
12	T		Old May-Day		19		42		15	2	19		3
13	F				17		44		30	2	46		4
14	S				16		45		44	3	11		5
15	B	5	Sun. aft. East. Rog. Sum.		14		47		59	3	33		6
16	M		From the Day of Easter in		12		48	19	13	3	58	4	0
17	T		[5 Weeks, 4 Returns		11		50		26		se		1
18	W				10		51		39	8	A13		2
19	T		CHRIST'S AS. Dunst. A.B.		8		53		52	9	12	0	1
20	F		On Mor. of Ascen. 5 Ret.		6		54	20	5	10	9		2
21	S				5		55		17	10	59		3
22	B	6	Sunday after Easter		3		57		29	11	38		4
23	M		TERM Ends		2		58		41	12	12		5
24	T		Pr. Frederick William Born		1		59		52	Morn.			6
25	W		[End		0	8	0	21	3	0	42	1	0
26	T		Oxford & Camb. Terms	3	59		1		13	1	11		1
27	F		Ven. Bede		58		2		23	1	35		2
28	S				57		3		33	1	56		3
29	B		Whit-Sund. K. Charles II.		56		4		42	2	17		4
30	M		Whit-Monday. [Reliaur.		55		5		51	2	43		5
31	T		Whit-Tuesday		54		6	22	0	3	12		6

Days	L. of D.	Day Inc.	D. breaks	Sun East	Tw. ends	C. aft. S.	7 Stars So.
1	14 49	7 5	2 4	6 50	9 58	3 10	0 A 57
6	15 5	21	1 50	55	10 12	42	
11	21	37	28	7 0	34	59	
16	36	52	4	4	59	4 2	11 M
21	50	8 6	0 24	8	11 41	3 50	
26	16 2	18	NoNight	12	NoNight	25	

1757

June hath XXX Days.

Full Moon, 2d, 55 m. past 8 Morning.
 Last Quarter, 9th, 11 m. past 1 Morn.
 New Moon, 16th, 12 m. past 3 Aftern.
 First Quarter, 24th, 49 m. past 7 Even.

Sun enters 25
 20th. 20 h. 47 m.
 Apparent Time.

1	W	Ember Week. <i>Nicom</i>	53	8	7	22	8	3	42	2	0
2	T	[Pr. & M.]	52	8			16	1	rises		1
3	F		51	9			23	9	A 27		2
4	S	Prince of WALES Born	51	10			30	10	19		3
5	B	Trinity Sund. <i>Boniface</i>	50	10			37	11	10		4
6	M	On the Mor. of the Holy	49	11			43	11	48		5
7	T	[Trin. 1 Return	48	12			49	12	21		6
8	W	Dr. & Cam. Terms Beg.	48	12			55	Morn.	3	0	
9	T	<i>Corpus Christi.</i>	47	13	23		0	0	49		1
10	F	Ps. Amel. & Car. B. Trin.	47	13			5	1	11		2
11	S	S. Barnab. [TERM Beg.	47	14			9	1	35		3
12	B	1 Sunday after Trinity	46	14			13	1	58		4
13	M		46	14			16	2	23		5
14	T		45	15			19	2	50		6
15	W		45	15			22	3	22	4	0
16	T		44	16			24		sets		1
17	F	St. Alban	44	16			26	8	A 49	0	1
18	S		43	17			27	9	32		2
19	B	2 Sunday after Trinity	43	17			28	10	10		3
20	M	<i>Edward</i>	43	17			29	10	42		4
21	T	Longest Day	43	17			29	11	9		5
22	W	King GEORGE II. Inaug.	43	17			28	11	34		6
23	T		43	17			28	11	56	1	0
24	F	St. John B. Midsum. Day	43	17			27	12	19		1
25	S		44	16			26	Morn.			2
26	B	3 S. aft. Tr. K. GEORGE	44	16			24	0	40		3
27	M	[II. Procl.	44	16			23	1	5		4
28	T		45	15			19	1	34		5
29	W	S. Peter and S. Paul. Trin.	45	15			15	2	7		6
30	T	[TERM Ends	46	14			12	2	48	2	0

Days	L. of D.		Day incr.			Sun East		Clo. aft.S.	7 Stars So.		
1	16	14	8	30	No real Night but conf. Day- light or Tiwl.	7	16	No real Night but conf. Day- light or Tiwl.	2	41	10M55
6		20		38			18		1	52	35
11		28		44			19		0	55	15
16		32		48			20		0	bef. 7	9 56
21		34		50			20		1	10	33
26		32	decr.	2			20		2	15	13

1757.

July hath XXXI Days.

Full Moon, 1st, 30 m. past 4 Aftern.
 Last Quarter, 8th, 12 m. past 9 Morn.
 New Moon, 16th, 42 m. past 6 Morn.
 First Quarter, 24th, at 7 Morn.
 Full Moon, 30th, at Midnight.

Sun enters ♋
 22d. 7 h. 46 m.
 Apparent Time.

1	F		3	46	8	14	23	8	ris	2	1
2	S	Visitation of B. V. Mary		46		14		4	8	53	2
3	B	4 Sunday after Trinity		47		13	22	59	9	39	3
4	M	Martin, Bishop		48		12		54	10	15	4
5	T	Old MIDSUMMER-DAY		48		12		48	10	49	5
6	W			49		11		42	11	13	6
7	T			50		10		36	11	35	3
8	F			50		10		29	12	0	1
9	S			51		9		22	Morn.		2
10	B	5 Sunday after Trinity		52		8		15	0	23	3
11	M			53		7		7	0	50	4
12	T			54		6	21	58	1	17	5
13	W			55		5		50	1	51	6
14	T			56		4		41	2	28	4
15	F	Switbin, Bp. of Winchester		57		3		32	3	15	1
16	S			58		2		22	sets		2
17	B	6 Sunday after Trinity		59		1		11	8	41	0
18	M		4	C		0		1	9	10	2
19	T			1	7	59	20	50	9	36	3
20	W	Margaret.		3		57		39	9	59	4
21	T			4		56		27	10	19	5
22	F	Magdalen. Ps. C. Mat. B.		5		55		15	10	42	6
23	S			6		53		3	11	51	0
24	T	7 Sunday after Trinity		8		52	19	51	11	30	1
25	M	St. JAMES, Apostle		10		50		38	11	59	2
26	T	St. Anne, Mother of V. M.		11		49		25	12	34	3
27	W			13		47		11	Morn.		4
28	T			14		46	18	57	1	19	5
29	F			15		45		43	2	14	6
30	S	Dog-Days Begin		17		43		29	ris	2	C
31	B	8 Sunday after Trinity		18		42		14	8 A	8	1

Days	L. of D.		Day dec. D. breaks		Sun	East.	Tw. ends.	Clo. bef. S.		7 Stars So
1	16	28.	o	6	7	19	No real	3	15	8 M 52
6		22	12	No real		4		9	32	
11		14	20					54	11	
16		4	30	Night.		13		Night.	5	28
21	15	52	42			9		50		31
26		38	56	o	52	5	11 4	57		11

1757. August hath XXXI Days

Last Quarter, 6th, 34 m. past 7 Night
 New Moon, the 14th, at 11 at Night
 First Quarter, 22d, 53 m. past 3 Aftern.
 Full Moon, the 29th, 2 m. past 8 Morn.

Sun enters ♈
 22d. 14 h. 3 m.
 Apparent Time.

1	M	Lammas-Day	4	19	7	40	17	59	8	43	2	2
2	T			21		39		44	9	11		3
3	W			23		37		28	9	37		4
4	T			24		36		12	10	2		5
5	F			25		34	16	56	10	27		6
6	S	Transfiguration		27		32		39	10	52	3	0
7	B	Sunday after Trinity		28		31		22	11	20		1
8	M			30		29		5	11	51		2
9	T			31		28	15	48	12	20		3
10	W	St. Laurence		33		26		31	Morn.			4
11	T	Princess Augusta Born		35		24		13	1	11		5
12	F	Old Lammas-Day		36		23	14	55	2	1		6
13	S			38		21		36	2	50	1	0
14	B	Sunday after Trinity		40		19		18	3	5		1
15	M	Assumpt. B. Virgin Mary		42		17	13	59	7	44	0	1
16	T			44		15		40	8	7		2
17	W			45		14		21	8	28		3
18	T			47		12		2	8	50		4
19	F			49		10	12	42	9	11		5
20	S			51		8		22	9	36		6
21	B	Sunday after Trinity		53		6		2	10	2	1	0
22	M			54		5	11	42	10	35		1
23	T			56		3		22	11	13		2
24	W	St. Bartholomew, Apostle		58		1		1	12	2		3
25	T		5	0	6	59	10	40	Morn.			4
26	F			2		57		20	1	5		5
27	S			4		55	9	58	2	15		6
28	B	S. aft. Trin. Augustine		6		53		37	3	30	2	0
29	M	St. John Baptist Beheaded		8		51		10	4	1		1
30	T			10		49		8	54	7	A	2
31	W			12		47		33	8	8		3

Days	L. of D.	Day dec.	D. breaks	Sun East	Tw. ends	C. bef. S.	7 Stars So.
1	15 20	1 14	1 24	7 0	10 34	5 47	6 M 47
6	5	29	44	6 55	14	5 21	28
11	14 49	45	2 2	50	9 56	4 41	9
16	31	2 3	20	45	39	3 48	5 50
21	13	21	35	39	24	2 41	31
26	13 55	39	50	34	9	1 22	13

1757. September hath XXX Days.

Last Quarter, 5th Day, at 10 Morn.
 New Moon 13th, 42 m. past 2 Aftern.
 First Quarter, the 20th, at Midnight
 Full Moon, 27th, 23 m. past 5 at Night

Sun enters the
 22d. 10 h. 15 m.
 Apparent Time.

1	T	Giles, Abbot	5	14	6	45	8	11	8	32	2	4
2	F	LONDON Burnt in 1666		16		44	7	49	9			5
3	S	[O. S.		17		42		27	9	28		6
4	B	13 Sunday after Trinity		19		40		5	9	58	3	0
5	M			21		38	6	42	10	33		1
6	T			23		36		20	11	18		2
7	W	Dog-Days End		25		34	5	57	12			3
8	T	Nativity of B. V. Mary		27		32		35	Morn.			4
9	F			29		30		12	0	56		5
10	S			31		28	4	49	1	54		6
11	B	14 Sunday after Trinity		33		26		26	2	52	4	0
12	M			35		24		3	4			1
13	T			37		22	3	40		sets		2
14	W	Holy-Rood Day		39		20		17	7	A 40		1
15	T			41		18	2	54	7	26		2
16	F			43		16		31	7	50		3
17	S	Lambert, Bishop.		45		14		8	8	17		4
18	B	15 Sunday after Trinity		47		12	1	44	8	46		5
19	M			49		10		21	9	23		6
20	T			51		8	0	57	10	61		0
21	W	St. MATTHEW, Apostle		53		6		34	11	0		1
22	T	Ember-Week		55		4		11	12	4		2
23	F			57		2	0	13	Morn.			3
24	S	Equal Day and Night		59		0		36	1	18		4
25	B	16 Sunday after Trinity	5	1	5	58	1	0	2	36		5
26	M	Cyprian		3		56		23	3	57		6
27	T			5		54		47		51		0
28	W			7		52	2	16	6	44		1
29	T	St. MICHAEL.		9		50		34	7	9		2
30	F			1		48		51	7	36		3

Day	L. of D.	Day dec.	D. breaks	Sun East.	Tw. ends	Clo. aft. S.	Stars	o
1	13 31	3 3	3 7	6 7	8 52	0 24	4 M	51
6	13	21	21	21	38	2 1		33
11	12 53	41	34	14	25	3 41		15
16	33	4	45	8	14	5 27	3	57
21	13	21	56	2	3	7 10		40
26	53	41	7	5 56	7 52	8 53		22

1757. October hath XXXI Days.

Last Quarter, 5th, 40 m. past 3 Morn.
 New Moon, 13th, at 5 Morning
 First Quarter, 20th, 26 m. past 7 Morn.
 Full Moon, 27th, 28 m. past 4 Morn.

Sun enters m
 22d. 17 h. 50 m.
 Apparent Time.

1	S	Remigius, Bishop	5	12	5	47	3	28	8	7	2	4
2	B	17 Sunday after Trinity		14		45		44	8	40		5
3	M			16		43	4	7	9	20		6
4	T			18		41		30	10	6	3	0
5	W			20		39		52	10	56		1
6	T	Faith, Virgin and Martyr		22		37	5	17	11	52		2
7	F			24		35		40	12	52		3
8	S			26		33	6	3	Morn.			4
9	B	18 S. aft. Trin. St. Dennis		28		31		26	1	55		5
10	M	Old Mich. Day. Dr. and		30		29		49	3	0		6
11	T	[Camb. Terms Begin		32		27	7	11	4	54		0
12	W			34		25		34	5	17		1
13	T	Edward, King and Martyr		36		23		56	6	sets		2
14	F			38		21	8	19	6	A26	0	1
15	S			40		19		41	6	56		2
16	B	19 Sunday after Trinity		42		17	9	3	7	30		3
17	M	Etheldred, Virgin		44		15		25	8	11		4
18	T	St. LUKE, Evangelist		46		13		47	9	4		5
19	W			47		12	10	9	10	3		6
20	T			49		10		31	11	11	1	0
21	F			51		8		52	12	26		1
22	S	K. GEORGE II. Crown'd		53		6	11	13	Morn.			2
23	B	20 Sunday after Trinity		55		4		35	1	43		3
24	M			57		2		56	3	3		4
25	T	Crispin		59		0	12	16	4	21		5
26	W				7	1	4	58	37	5	38	6
27	T							56	57	5	rises	2
28	F	S. Simon and S. Jude, Ap.				3		54	13	17	6	7
29	S					5		52	37	6	43	2
30	B	21 Sunday after Trinity				7		50	57	7	20	3
31	M					9		48	14	17	8	4

Days	L. of D.	Day	dec.	D. breaks	Sun	Eaft.	Tw.	ends.	Clo.	aft.	S.	7 Stars	So.
1	11	35	4	59	4	18	5	50	7	41	10	30	3 M 4
6		15	5	19		29		44		30	12	0	2 46
11	10	55		39		39		37		20	13	20	27
16		35		59		49		31		10	14	28	8
21		17	6	17		59		25		0	15	21	1 50
26	9	57		37	5	8		19	6	51	15	56	29

1757. November hath XXX Days.

Last Quarter, 3d, 48 m. past 11 Night
 New Moon, 11th, 39 m. past 6 Night
 First Quarter, 18th, 5 m. past 3 Aftern.
 Full Moon, 25th, 7 m. past 6 Night

Sun enters ♄
 21st, 13 h. 41 m.
 Apparent Time.

1	T	All Saints	7	12	4	47	14	36	8	53	2	5
2	W	Ps. of <i>Orange B.</i> All Souls	14			45		55	9	46		6
3	T	On the mor. of All Souls.	16			43	15	14	10	44	3	0
4	F	[1 Ret.	18			41		33	11	40		1
5	S	Powder-Plot, 1605, O. S.	20			39		51	12	48		2
6	E	22 S. Tr. Mich. TERM	21			38	16	9	Morn.			3
7	M	Pr. <i>Hen. Fred. B.</i> [Begins	23			36		27	1	54		4
8	T		24			35		44	3	2		5
9	W	Lord-Mayor's D. at <i>Lond.</i>	26			33	17	1	4	11		6
10	T	King <i>GEORGE II.</i> Born	28			31		18	5	24	4	0
11	F	<i>St. Martin</i> [2 Ret.	30			30		35)	few		1
12	S	On the mor. of <i>St. Martin</i> ,	31			29		51	5	A 30	0	1
13	B	23 S. aft. Tr. <i>Britius</i> , Bp.	32			27	18	7	6	10		2
14	M		34			25		23	6	58		3
15	T	<i>Machutus</i> , Bishop	36			23		38	7	55		4
16	W		37			22		53	9	3		5
17	T	<i>Hugh</i> , Bishop of <i>Lincoln</i>	38			21	19	8	10	16		6
18	F	In 8 days of <i>St. Martin</i> ,	40			19		23	11	32	1	0
19	S	[3 Ret.	42			18		37	12	47		1
20	B	24 S. aft. Trin. <i>Edmund</i> ,	44			16		50	Morn.			2
21	M	[King and Martyr	45			15	20	4	2	2		3
22	T	<i>Cecilia</i> , Old Martinmas-Day	46			14		17	3	19		4
23	W	<i>St. Clement</i>	48			12		29	4	35		5
24	T		49			11		41	5	49		6
25	F	Pr. <i>Wil. Hen.</i> Born. In 15	50			10		53)	rises	2	0
26	S	[days of <i>S. Martin</i> , 4 Ret.	51			9	21	4	5	A 8		1
27	B	Advent-Sunday	52			8		15	5	48		2
28	M	Michaelmas TERM Ends	53			7		26	6	37		3
29	T		54			6		36	7	28		4
30	W	<i>S. And. Ps. Dow. Wales B.</i>	55			4		46	8	24		5

Days	L. of D.		Day dec.		D. breaks		Sun	East.	Tw. ends.		Clo. aft. S		Stars So	
1	9	35	6	59	5	17	5	13	6	42	16	14	1	M 4
6		17	7	17		24		7		35		7	0	44
11		0		34		32		2		28	15	40		24
16	8	45		49		37	2	57		23	14	51		3
21		30	8	4		43		53		17	13	42	11	42
26		18		16		49		49		11	12	13		21

1757. December hath XXXI Days.

Last Quarter, the 3d, 31 m. past 9 Night
 New Moon, the 11th, 28 m. past 7 Morn.
 First Quarter, the 17th, at Midnight
 Full Moon, the 25th, 3 m. past 11 Morn.

Sun enters v^r
 21ft. 1 h. 45 m.
 Apparent Time.

1	T		7	57	4	3	21	55	9	25	2	6
2	F			58		2	22	4	10	27	3	0
3	S			59		1		13	11	31		1
4	B	2 S. in Advent. <i>Barbara</i>	8	0	0			21	12	36		2
5	M			0	0			29	Morn.			3
6	T	<i>Nicholas, Bishop</i>		1	3	59		36	1	25		4
7	W			2		58		42	2	53		5
8	T			3		57		49	4	6		6
9	F			4		56		55	5	20	4	0
10	S			5		55	23	0	6	36		1
11	B	3 Sunday in Advent		5		55		5	7	fets		2
12	M			6		54		9	5	A 29	0	1
13	T	<i>Lucy, Virg. and Martyr</i>		6		54		14	6	38		2
14	W	Ember Week		6		54		17	7	57		3
15	T			7		53		20	9	7		4
16	F	[End		7		53		23	10	20		5
17	S	<i>Oxford & Camb. Terms</i>		7		53		25	11	42		6
18	B	4 Sunday in Advent		8		52		27	12	57	1	0
19	M			8		52		28	Morn.			1
20	T			8		52		29	2	15		2
21	W	<i>St. Thomas. Shortest Day</i>		8		52		29	3	29		3
22	T			8		52		29	4	30		4
23	F			8		52		28	5	44		5
24	S			8		52		27	6	43		6
25	B	CHRIST-MASS-DAY		7		53		25	7	rites	2	0
26	M	<i>St. STEPHEN</i>		7		53		23	5	A 0		1
27	T	<i>St. JOHN</i>		7		53		21	5	59		2
28	W	<i>Innocents</i>		6		54		18	7	1		3
29	T			6		54		14	8	3		4
30	F			5		55		10	9	4		5
31	S	<i>Sylveſter</i>		4		56		6	10	9		6

Days	L. of.	Day	decr.	D. breaks	Sun	East	Tw. ends	Clo. aft. S.	7 Stars	So.				
1	8	6	8	28	5	54	4	46	6	6	10	25	11	A 0
6	7	58		36		56		43		4	8	21	10	38
11		50		44		58		41		2	6	6		16
16		46		48	6	0		40		0	3	42	9	54
21		44		50		1		40	5	59	1	11		32
26		46	Incr.	2	6	0		40	6	0	1	20		10

Chronological NOTES for the YEAR 1757.

Golden Number	10	Shrove-Tuesday	February 22
Cycle of the Sun	2	Easter-Day	April 10
Epaet	9	Whit-Sunday	May 29
Roman Indiction	5	Trinity-Sunday	June 5
Dominical Letter	B	Advent-Sunday	Nov. 27

ECLIPSES in the YEAR 1757.

THERE will happen Four Eclipses this Year, viz. Two of each Luminary ; whereof those of the Moon will only be Visible to the Inhabitants of Great-Britain.

- I. February 4th, the Moon will be Eclipsed at 7 h. 6 ' Morn. near 7 Digits on the Upper Side ; the Beginning of the Eclipse 5 h. 27 '. Mid. 6 h. 48 '. End 8 h. 9 '. Total Duration 2 h. 42 '.
- II. February 18th, at 1 h. Afternoon, the Sun will be 8 Digits Eclipsed, on the South Side in, \propto 0°. 9 '. Vertical to the Ethiopian Ocean, Lat. 11 Deg. South, Long. 15°. West.
- III. July 30th, the Moon will be Eclipsed at 11 h. 54 '. at Night ; the Beginning 10 h. 20 '. Middle 11 h. 54 '. End 1 h. 18 '. Total Duration 2 h. 58 '. Digits Eclips'd 11°. 30 '.
- IV. August 14th, at 11 at Night, the Sun will be Eclipsed 5 Digits on the Upper Side, in \odot , 22 Deg. Vertical to the Great-Ocean, Lat. 14°. North, Long. 165°. W.

RALPH HULSE.

THE Times and Quantities of the Two Visible Eclipses, for the Meridian of London are calculated by Mr. Edward Greensted, as below.

- I. The Moon will be Eclipsed 4th February in the Morning. Beg. 5 h. 20 '. Mid. 6 h. 45 '. End 8 h. 10 '. Dur. 2 h. 50 '. Digits Eclips'd 6°. 41 '.
- II. The Moon will be Eclipsed 30th July in the Evening. Begin. 10 h. 16 '. Middle 11 h. 48 '. End 1 h. 19 '. Dur. 3 h. 3 '. Digits Eclips'd 11°. 32 '.

* * Note, That in the CALENDAR, the First Column shews the Day of the Month, the 2d. the Day of the Week, the 3d. the Saints-Days and Holidays, the 4th. and 5th. the Times of Sun-Rising and Setting, the 6th. the Sun's Declination, the 7th. the Moon's-Rising and Setting, and the 8th. the Moon's Age.

ANSWERS to the ÆNIGMA'S in the last YEAR'S DIARY.

- I. In EUNUCH.
- I. A DISH-CLOUT.
- II. A SPADE.
- I. DRUNKENNESS,
- V. SALT.
- V. BUTTONS.

- VII. A CARD-TABLE.
- VIII. CANDLES
- IX. The STOCKS.
- X. JUDGMENT.
- XI. TOBACCO.
- Prize. An Artificial Fishing-Fly.

PRIZE ÆNIGMA Answer'd. 1757.

ANSWER to the *Prize-Ænigma*, by Mr. G. LANGLEY.

When vernal *Sol*, with his all-chearing Light,
Dispells the gloomy Vapours of the Night ;
When *Nature* smiles, and *Heav'n* is all serene,
And gentle *Zephyr's* fan the enamell'd Green ;
How pleasing *then* ! to walk with BAITED-HOOK,
To the clear Mirrour of some murm'ring Brook,

Answer'd by Mr. FR. WESTON.

As thro' *Diarian Streams* of Wit I stray'd,
I stopt at last where *Cælia's Lines* were laid,
When such nice Art and Judgment struck my Eyes
That rais'd at once both Pleasure and Surprise :
I took the BAIT——but oh ! I feel the Smart,
Thy *Lines*, seraphic *Maid*, have seiz'd my Heart.

Answer'd by the Celebrated Miss M. T—T.

When *Love* invites, be cautious, oh ! ye Fair !
Beneath the gilded BAIT suspect a Snare.

Answer'd by RUSTICUS, to his Friend T. B.

Tho' *Beauty* smiles, trust not the treach'rous Joy,
Beneath the tempting BAIT a Hook may lye.

Answer'd by ENDYMION.

They who for glitt'ring Grandeur's empty *Shew*
The low Estate of real Worth despise,
Will find it's fanci'd Joys delusive Woe.
Like simple *Trouts* ensnar'd with PAINTED-FLIES.

Answer'd by Mr. J. CHEADLE.

The wily Angler, with DELUSIVE FLY
And barbed Hook, ensnares the finny Fry ;
So artful *Harlots*, with seducing Charms,
Tempt thoughtless *Youth* to Ruin in their Arms.

A Number of other very pretty Answers (in Verse) to the PRIZE ÆNIGMA (in particular) have been received; from Miss A. Williams; Miss A. Hosken; Miss A. Rickabey; Miss Lucy Selby; Miss Bradburn; Sophia; Beliza; Mr. J. Clarke; Mr. Isaac Tarrat; Mr. T. Breaks; Mr. J. Fletcher; Mr. E. Griffiths; Mr. W. Patrick; Piscator; Jack Angler; Mr. J. Webster; Mr. E. Paul; Mr. T. Wilkin; Mr. T. Osborne; Mr. G. Nokes; Mr. Alex. Rowe; Mr. T. Sandling; Scortonensis; Mr. W. Smith; and Others; which are too many to be inserted on the same Subject, even, could we possibly find Room for them. — The following Letter containing a General Answer of all the ÆNIGMA's, may not, however, be improper.

Mr. ALMANACK-MAKER,

I Can't think what your *Prize Diaries* are good for, at *Candlemas*,
except it be to finge a CAPON, wrap up Sugar or SALT, or
put round the CANDLES for Mama's CARD-TABLE: Or mayhap
they may serve *Nell* instead of a DISH-CLOUT, to rub down the Spawl
in my Father Sir *Tunbelly's* SMOAKING Room, after he and the
Squire have got DRUNK enough to merit a Place in the STOCKS.
Indeed, Brother *Hodge* says, he can clean his BUTTONS with
them, and as they are printed red and black, he can make out of
them *Wings* for his FLIES, when he goes to catch Trout. He bid
me put all this in Rhime, but I have little JUDGMENT in *Jingling*,
was always for plain speaking, and am used to call a SPADE, a
SPADE; so you may e'en send them, if you please, to our Carrier,
and he shall bring you some Riddles on his next Turn to London:
Hodge will put them in Rhime for

1, 5.

8, 7.

2.

11.

4, 9.

6.

Prize

10.

3.

Your Friend and Servant,

Miss HOYDEN.

Mall Ormishaw answers the *Ænigmas* in her Reply to
Annabella, who had questioned her about her Lover.

“ For whom, you ask, shall *Hymen* trim
“ The bridal TORCH, if not for him? 8.
No Fopling, OF AMBIGUOUS NATURE, 1.
Be-SNUFF'D, be-BUTTON'D, HE-SHE-CREATURE; 11, 6, 1.
A Slave to Fashion, Slave to Dress,
Whose Figure speaks his Emptiness;
Vain, glittering, gaudy Butter FLY!
He'll ne'er provoke a single sigh. *Prize*.
No Cot, with DISH-CLOUT at his Tail! 2.
No DRUNKEN Sot, who swills in Ale: 4.
No GAMESTER—No *Change-Ally* Clod, 7.
Who makes the STOCKS his only God: 9.
To such as these; I swear by Heaven,
My Hand and Heart shall ne'er be given;
Sooner the friendly SPADE shall save 3.
My Virgin Honours for the Grave.
Be this the Man, if e'er I wed—
Of JUDGMENT sound, politely bred, 10.
With Wit enough to SEASON Life; 5.
With Complaisance to please a Wife;
Good-natur'd, generous, kind and free;
This be the Man that's made for me!

All the *Ænigmas* answered by Miss *Lucy Selby*.

To dear *Sophia*, my lov'd Friend,
The *Season's* Compliments I send:
May smiling Health still bless your Hours,
And ev'ry Joy sincere be yours.
Oh! *Sophy*, shun Love's dang'rous Snare,
The BAITED-HOOKS of Men beware!

Prize

B

Trust

Trust not your Heart with EMPTY BEAUS	1 (<i>An Eunuch.</i>)
Whose Love is center'd in their Cloaths:	
Defiance bid to BUTTON, Feather,	6.
Essence, SALTS, SNUFF-Box, all together.	5, 11.
The SLOVEN too, and Clown despise,	2 (<i>a Dish-clout.</i>)
The nauseous SOT, and Man of Noise;	4 (<i>Drunkennes.</i>)
But most the Gaming-Snark avoid	
Whose STOCK's by SPADES and CLUBS supply'd.	9, 3, 7 (<i>a Card-table.</i>)
But why shou'd I, my <i>Sophy's</i> Prudence fear,	[<i>a Candle.</i>]
Who's blest with SPARKLING Wit and JUDGMENT clear?	8, 10.

An Answer to all the Ænigmas by Miss *Hen. Redfern.*

FLY hence, ye EUNUCHS, to your native Shore,	Prize, 1.
Nor of their <i>Wealth</i> rob easy Britons more.	
May each SALT <i>Jade</i> , in RAGS the PILL'RY grace;	5, 2, 9.
Nor, e'en by CANDLE Lights, SOTS shew their Face.	4, 8.
Let the Gold-BUTTON'D Cit, with SNUFF dawb'd o'er,	6, 11.
Attend his Trade—nor haunt CARD-TABLES more.	7.
Let Greatness learn in Virtue's Paths to move,	
And Plough and SPADE the Rustic's JUDGMENT prove.	3, 10.

The Ænigmas answered by *Cælia*, to the Author.

'Tis not UNMANLY WARRIERS can inspire	1.
Insulted Britons with true martial Fire.	
Will roaring Canons please the tender Ears	
Of Youths accustom'd to Italian Airs?	
Constant at Balls and Plays, where WAX gives Light,	8.
Who'll bear the Sulphur of the smoky Fight?	
Can Fribbles lac'd, and BUTTON'D up with Gold,	6.
Endure or Summer's Heat, or Winter's Cold?	
Not such our Breed, when Edward bravely won,	
Cressy's fam'd Field, or Poitiers's his Son.	
CARD-TABLES then, nor motley Routs were seen,	7.
To kill the lazy Hours; and chase the Spleen;	
Distaff, or DISH-CLOUT, Needle or the Loom,	2.
Kept the chaste Matrons well employ'd at Home;	
Whilst undebauch'd by DRINKING, strong by Toil,	4.
The Husbands broke with SPADES the stubborn Soil:	3.
No Art they wanted Appetite to cause,	
Their Seas'ning SALT, and Hunger all their Sance.	5.
Labour! thou Road to Peace, to Safety, Health,	
Thou Prop of Kingdoms, and great Source of Wealth,	
A surer Fence to Honesty by far	
Than STOCKS, or Jails, or Judge and Juries are;	9.
Oh! Shed thy benign Influ'nce round the Land,	
Britain the Ocean then shall soon command:	
Thro' thee she'll find, (not forc'd to buy with Gold)	
The surest Guarantee within herself.	

Then

Then you, my Friend, may SMOAK YOUR PIPE at ease 11.
And cull, with JUDGMENT, Scraps the Fair to please, 10.
I make for Strepbon FLIES the Trout t' ensnare, Prize.
Both laugh at France, and all the Noise of War,

The Ænigmas answered in Tar's Preference of a marine Life.

By French Johnson of Kirtan, near Boston, Lincolnshire.

I'll boldly o'er the Billows steer	With Stores well cur'd, and Wind
Tho' Hazards round my Compass veer;	abast 5.
* Marina lives, tho' rougher Seas on,	(Good Luck athwart Ships' fore and aft)
Conducted by magnetic REASON. 10.	She SNUFFS at Surges, mounts the
I wou'd not wear, for Pendant, Jack,	Billows 11.
A DISH-CLOUT streaming on my	While Land-men hand their downy
Back. 2.	pillows;
Nor wou'd I, like Alcides, grovel,	The hardy Jacket fears no Weather,
To clean out Stalls with SPADE or	Tho' meanly trim'd with HORN or
Shovel; 3.	Leather. 6.
Nor can CASTRATO's squalling	Inglor'ous Ease is not our Choice,
Note, 1.	To steer our Lives by CARDS and
Discharg'd thro' Scupper of his	Dice: 7.
Throat,	The Man wescorn who anxious locks
Heave up my Courage, or depress it:	His Gold in Chest, like SOT i'th'
Life's but a Traverse, if I guess it.	STOCKS, 4. 9.
Marina fan'd by gentle Gales	And like an Alligator waits
In Pride displays Top-gallant Sails,	To seize the Prey by crafty BAITS.
* Ship's Name.	Prize.

All the Ænigmas answered by Mr. Sam. Bentley.

Ladies—a strange Soliloquy attend;
A Lady's too, your Fav'rite, and your Friend;
Who owns your Merit, and asserts your Fame:
For, know ye Belles, Diaria is her Name.—
High on a Pile of Almanacks she sat,
And thus she rag'd, and thus bewail'd her Fate.
And was I, then, reserv'd for this Disgrace?
This Wretch obtruded, to my close Embrace!
An EUNUCH for my Inmate! racking Thought—
I will, I must, resent it, as I ought:
For fifty three revolving Years have I
For thee kept stainless—ARTIFICIAL FLY 12.
Thou Lie to Nature.—Ev'ry Day at Home,
Mops, DISH-CLOUTS, female Weapons be thy Doom: 2.
And when Abroad, may Pillory or STOCKS, 9.
Keep thee in Durance, with their strongest Locks;
There rest secure, with DRINKING, senseless Guttons, 4.
Till—let me think—why, till thy A—se makes BUTTONS: 6.
'Twas this, or Death, dire Omens did foretel
When, from my trembling Hand, SALT lately fell! 5.
Blue burn'd the CANDLES! but what most dismay'd, 3.
Into my House came Richard with his SPADE! 3.
Thus

Thus the poor Lady rail'd, and moan'd by Fits;
 Her JUDGMENT dormant, well nigh lost her Wits.
 Her Rage now spent, and Bosom something eas'd,
 She took a Pinch of SNUFF, and grew more pleas'd;
 Then went Abroad to try if she was able
 To ease her Troubles—at the dear CARD-TABLE, 7.

All the Ænigmas answered by *Sylvius*, on Contentment.

Est ulubris, animus si te non deficit æquus. Hor. Ep. II.

How great the Bliss which from Contentment springs!
 Content—the beardless EUNUCH joyful sings; 1.
 The Sailor, jovial, tempts the BRINY Main; 5.
 Th' industrious Merchant's happy in his Gain.
 More than rich Misers with their STOCKS of Wealth, 9.
 The WISE are blest, with Competence and Health; 10.
 They covet nothing great, but live secure
 From all the glitt'ring BAITS that Fools allure, Prize.
 Supremely blest the Fop!—politely lac'd—
 With SNUFF and Gold—with diamond BUTTONS grac'd. 11, 6.
 In dirty RAGS blind Beggars dance and sing; 2.
 The SOT's, in Fancy, happy as a King. 4.
 Soon as the LAMP of Day dispels the Shade, 8.
 Cheerful the lab'ring Rustick plies his SPADE; 3.
 At Night, his TABLE yields him wholesome Fare, 7.
 His Bed sweet Sleep, and undisturb'd with Care.

Delight from Knowledge, Wealth, or Fame may flow,
 But pure Content's the greatest Bliss below;
 In ev'ry State, in ev'ry Place, we find
 True Happiness in a contented Mind.

The Ænigmas answered in the Dialect of a wrangling Couple.

By *Henry Season*, M. D. of *Broomham, Wilts.*

What REASON, <i>Ralph</i> , you DRUN-	I'll risque the Pox, the Goat, or
KEN Oaf, 10, 4.	STOCKS, 9.
That you so vile have been,	Ere bear its hellish Motion.
To rob your Spouse, and strip the	Her Rage to vent, then at him went
House,	The DISH-CLOUT, then the
To spend it all in Gin?	CANDLE, 2, 8.
You GAME and rant, while Bread	She seiz'd the SPADE! How's that
I want; 7.	you Jade! 3.
To me an EUNUCH prove, 1.	You Wh—re let go the handle.
You FLY my Bed, and wish me	I'll make you SMOKE—Quoth she,
dead, Prize.	you joke; 11.
While Harlots share your Love.	Tho' such big Looks you put on,
Quoth he, your Tongue, like Clap-	You're but a Huff, I know by Proof;
per hung,	I fear you not a BUTTON.
Is louder than the Ocean;	

The

The Ænigmas answered by Mr. Benj. Lydal. A Vision.

When Sol to th' West declin'd, with feeble Ray,
And Night slow rising did her Gloom display;
When sable Horrors danc'd before the Sight,
And waxen TAPERS catch'd a glimm'ring Light;
I from the Day's tumult'ous Cares withdrew;
Fatigu'd my Limbs, and tir'd my Spirits too:
Soft Slumbers soon my weary'd Pow'rs confin'd,
But active Fancy revell'd in the Mind.
Methought, *Minerva*, on a Throne was plac'd,
In mantled Blue, with rich Embroid'ry grac'd;
Whence from her Lips, these solemn Cautions flow'd,
To warn, and guide unwary Youth bestow'd.

"Wou'd you the Realms of Bliss securely win,
"With *Scoffers* mix not, nor with *DAUNKARDS* sin;
"Intemp'rance shun, and those, it's abject Slaves,
"Who, wilful, dig their own untimely Graves. 4.
"Let not the *HARLOT's* wanton Charms entice, 3.
"Tho' soft, as *EUNUCH's*, is the *Siren's* Voice; 2.
"Fly th' insidious *GAMESTER's* treach'rous BAIT, 7, 12.
"That sure Prognostic of a wretched Fate.
"GRIND not the Poor to heap large *STOCKS* of Wealth, 11, 9.
"Man's blest below in Competence and Health.
"SEASON your Converse still with *WISDOM's* Rules, 3, 10.
"Nor care a *BUTTON* for the Scoff of *Fools*; 6,
"In *Virtue's* Paths with steady Vigour tread,
"By *Reason* guided, and by Conscience led.

In this Manner all, or most of the Ænigmas were also answered by *Dorinda*, *Emilia*, *Umbra*, *Mrs. Grace Tedow*, *Mr. S. Bamfield*, *Enira*, *W. F.*; *Mr. S. Hodgkin*, *Mr. W. Litson*, *Mr. Jos. Lord*, *Mr. F. Mangle*, *Mr. R. Marsh*, *Mr. G. Stapeley*, *Mr. J. Taylor*, *Mr. Cha. Underwood*, *T. V.* and some others; whom we shall endeavour to oblige, in turn, when Opportunity permits.

ANSWERS to the QUERIES in the last-Year's Diary.

Quære, I. answered by *Sylvius*.

Tranquillity and *Self-Satisfaction* are observed to abound most among the lower Class, which make up the Bulk of Mankind; who being generally unlearned, and having little or no Knowledge of Things beyond their particular Professions; I think we may reasonably conclude, that the Want of Knowledge contributes most to that *Tranquillity* and *Self-Satisfaction* which they enjoy.—The wisest of Men hath said, that *be that increaseth Knowledge increaseth Sorrow*.—The celebrated *Mr. Pope*, also expresses himself to the same Purpose:

"In Parts superior what Advantage lies?

"Tell (for yoh can) what is it to be wise?

- " 'Tis but to know how little can be known ;
 " To see all others' Faults, and feel our own :
 " Condemn'd in Bus'ness or in Arts to drudge,
 " Without a Second, or without a Judge :
 " Painful *Prebeminence* ! yourself to view
 " Above Life's Weakness, and it's Comforts too. *Essay on Man*,

If, as another great *Genius* affirms, there is a *Pleasure in Madness* which the *Mad* only know, there is, certainly, a *Pleasure* that the *Ignorant* enjoy, which the *Wise* cannot partake ; who are too sensible of their own Situation, and the *Instability* of all human Affairs, to experience that Satisfaction and Self-approbation which *Ignorance* inspires.

Quære II. answered by *Enira*.

Cuckolds are said to wear *Horns*, from a Custom in the *East*. The *Emperor*, when he entered into an House, to indulge his *Pleasures*, used to hang up a *Pair of Horns*, above the Door, to signify that none should dare to interrupt him. And in that Case, not even the *Husband* himself durst presume to approach near his own Door.—Mr. *Morris* thinks, that the Custom of ascribing *Horns* to *Cuckolds*, had its Rise from one of our own *Kings* ; who, having lain with the *Wife* of one of his *Subjects*, settled an Estate upon the *Husband*, on Condition that he, on a certain Day, once in the Year, should appear in Publick, with a large *Pair of Horns* upon his Head.—But, without calling in Question the Facts referred to by our Correspondents, might not the Custom take its Rise from this ; that *Cuckolds*, like the *Males* of all *borned Beasts*, want the Power to secure to themselves the sole Possession of their *Females*, and are only permitted to enjoy them in common with others ?

Quære III. answered by *Sylvius*.

Honesty, or the Practice of *Equity*, is, strictly speaking, a simple *Virtue* ; and, considered as such, will not admit of different Degrees ; though there may be different Degrees of *Disbonesty*. A Man, by the Practice of *Equity*, *Charity*, *Benevolence*, &c. is often called *very honest* ; but these are additional *Virtues*, not different Degrees of *Honesty*.

Quære IV. answered by *Emilia*.

Tho' we set aside Custom, *Men* are the proper Persons to begin a *Courtship*, as they are naturally of a bold, enterprizing Disposition ; whereas the Timidity and natural Modesty of our *Sex* (in general) will not suffer us to begin an *Affair* of such Consequence.

The same answered by *Enira*.

God Almighty is a God of Order ; and as the *Male*, in the whole Brute Creation, is the pursuing Object, by Analogy we infer, that Man ought, nay may perhaps be so constitutionally framed, both as to his Organs and Appetites, as to be forcibly impelled, to make the first Advances. *Milton's* Authority is unquestionably good, where he introduces *Adam*, relating to the *Angel Raphael*, his first Meeting with *Eve*.

—————" tho' divinely brought,
 " Yet Innocence and Virgin Modesty,

" Her

“ Her Virtues, and the Conscience of her Worth,
 “ That would be woo'd, and not unfought be won,
 “ Not obvious, nor obtrusive, but retir'd
 “ The more defireable, or to say all,
 “ Nature herself, tho' pure of sinful Thought,
 “ Wrought in her so, that seeing me, she turn'd;
 “ I follow'd her. ———

A just and full Answer to this, and to some other Queries, was given by our ingenious Correspondent Mr. H. Season, but came to hand too late to be inserted.

ANSWERS to the REBUSES and PARADOXES in the last Year's DIARY.

Rebus I. answered by Miss *Nanny Rickaby.*

By *Tods* their Wool the Shepherds poize,
 In *Dens* fell Lions make a Noise,
 A *Ham* of Bear's in much Request;
 So *Tod-den-bam* is where you rest.

The same answered by Mr. *Ralph Hulse.*

Friend *Lampit's* Rebus plainly tells,
 At *Toddenbam* his Worthip dwells.

Rebus II. answered by Miss *Nanny Hosken.*

An *A*, the one-fifth of *Saul's* Uncle must be,
 Five Hundred stands shortest when wrote with a *D*,
 The Colour reversed is *RED*, to be plain;
 An *ADDER* is, therefore, the *Creature* you mean.

The same answered by Mr. *W. Patrick.*

By the Fifth-part of *Abner*, and *D* to it join'd,
 With *R, E, D*, chang'd, an *Adder* I find.

Paradox I. answered by Mr. *James Giles.*

The *Bat* or *Flittermouse* partakes both of the *Mouse* and the *Bird*, but most of the *Mouse*: it lays no *Eggs*, but brings forth its young alive, and suckles them.

The same answered by *Emilia.*

A *Bat*, I must own, is a very odd *Creature*,
 A *Bird*, by its *Wing*, but of *Quadrupede Nature*.

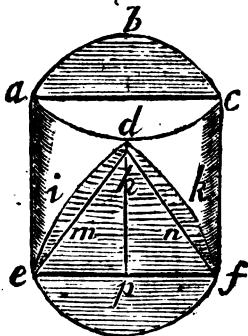
Paradox II. answered by Mr. *Rich. Morris.*

The faithless *Seas* I ne'er did trust, nor cross the *Line* did stride;
 Friend *Gibbons* he may thither go—there keep his *Whitfentide*.

The same answered by the Proposer, Mr. *Rich. Gibbons.*

In the Year 1739, the *Sun* entered *23* on *Whit-sunday*, being the longest Day in *N. Lat.* the shortest in *S. Lat.* and equal to the Night under the *Line*; so that any Person, crossing the *Line* that Day, fulfilled the Conditions of the *Paradox* in every Respect.

Paradox III. answered by Mr. Tho. Osborne.



Let a Cylinder $acfe$, whose Diameter and Altitude are each 8 Inches, be cut through the Diameter ef , so as to form the elliptical Section $eikf$, whose Semi-transverse Axis pd is 8 Inches. Pare away the Sides $emdi$, $fn dk$, till you come to the strait Lines ed , fd ; then will the triangular Side edf fill the triangular Hole; the End $abcd$, will fill the circular Hole; and if the *Wedge* be so applied to the Square Hole, that efc may coincide therewith, it will fill it also.

This Gentleman, Mr. W. Tellenbach, and some others, inform us, that the above Paradox was printed, as a mechanical Problem, in the *Delights for the Ingenious*, in the

Year 1711; and are a little severe upon Mr. Charlton, for re-proposing it. But as we know him to be a Person of real Abilities, and a very good Mathematician, we are inclined to think, that he himself was imposed on by some other Person, and knew, no more than ourselves, of its being in Print before; since we cannot conceive, that a Man of his Understanding would, at the Expence of his own Character, condescend to be aiding in the little Practices set on Foot against the Interest and Reputation of this Diary.

The Chronological Problem answered by Mr. Rich. Gibbons.

The three Primes are 2, 3, and 5; by which are expressed

235 Lunations, the *Metonic* Period;

532 Years, the *Dionysian* Period;

325 the Year of the Council of *Nice*.

We have not been favoured with any Attempt, from our Correspondents, to explain the Passage. proposed out of *Virgil*; in which the *Poet* (if he had any serious Meaning at all) seems to allude to the Notion of Those, who held the Earth to be an unmeasurable Plain, bounded by, and meeting the Heavens or Sky at an immense Distance.

NEW ÆNIGMAS to be ANSWERED in the next YEAR'S DIARY.

I. Ænigma 392 by *Celia*.

<p>TO great and noblest Beings I'm ally'd, Yet not by Blood to any Kindred ty'd. At the first Dawn of Life I meet my Doom, Pales to my Relief kind Succours</p>	<p>But so perverse my Nature, such my Pow'r, Those that receive and lodge me, I Yet other's Wants I do in Turn supply; And, urg'd by their Commands, like</p>
--	---

As

As thro' the Town your rapid *Chariot* wheels
 You oft' may see me at your Horses
 Heels ;
 Nay, let me choose my Ground, with
 all his Strength
 Your fleetest Steed can't leave me
 half a Length.
 In Poetry an *Emblem* I appear,
 And serve at ev'ry Turn the *Brave*
 and *Fair* ;

I urge in Fight the *Heroes* to engage,
 I teach the *Bard* to sing the Battle's
 Rage ; [Dart,
 No *Lover* yet e'er felt the pleasing
 Nor *Sappho* could without me paint
 the Smart ; [fess,
 For me the *Fair* their Passion oft con-
 When by my *Name* their Lovers they
 exp'res : [to prove,
 Who in Return, Beauty's great Force
 Call by a *kindred Name* the *Maid*
 they love.

II. *Ænigma* 393. by *Sylvius*.

Mancipium Domino, & frugi ——— *Amicum*

Hor. Sat. vii.

Ladies, your Slave, who tends you
 twice a Day,
 In Masquerade a Visit comes to pay.
 By Art and Labour torn from Na-
 ture's Bed ; [Head :
 My Maker fashion'd me without a
 My Body's thick and short, and long
 my Nose is,
 In Shape much like an Elephant's
 Proboscis ; [Back,
 Like him, too, I've a Turret on my
 But Legs and Feet I very often lack.
 Sometimes by your fair Hands I'm
 kindly press'd ;
 By you am highly valu'd and caress'd.
 Say how I gain your Favour and
 Esteem ? [ture seem.
 That such an awkward, shapeless Crea-
 I have a younger Brother, — tall
 and smart, — [ter part.
 Your Fav'rite too, — almost my Coun-
 Dear Ladies, pray mistake not him for
 me ; [than he.
 Amongst your Sex, I'm more esteem'd

With rural Nymphs I'm seen of
 ruddy Hue, [you :
 Tho' mostly fair and brilliant with
 With them, am clad in homely brown
 or sable ; [Table :
 But seldom in that Garb attend your
 There I am neat and elegantly deckt,
 To honour you, and shew your Friend's
 Respect. [tend ;
 When you command, submissive I at-
 Your faithful Servant, and your
 warmest Friend.
 My dearest Blood I spend to serve the
 Fair ;
 And, Herald like, your Pedigree de-
 clare.
 Now, Ladies, whilst the Cards are
 dealing, try
 To find me out ; perhaps I may be
 nigh :
 But pray despise me not, nor think me
 base,
 When you pluck off the Mask, and
 see my brazen Face.

III. *Ænigma* 394. by *Endymion*.

From being fine and nicely dress'd,
 By sudden, weighty Cares oppress'd
 To Prison I've been led,
 So quick a Change, must disagree
 With others, who have oft like me
 Too tenderly been bred ;
 Harden'd by Ills, I've learn'd to bear
 Misfortune's Edge without a Tear ;

—— To make me some Amends,
 Now — I'm releas'd, if you go
 'Mongst Rich or Poor, or High or Low,
 You'll find I still have Friends.
 For Ladies with me freely prate
 At Tea, or o'er their Chocolate,
 Of Fashions, Balls and News,
 And

And when to dine at Feasts I'm prest,
 —My Lord—and so will every Guest,
 My *Deshabille* excuse:
 Some Beaux indeed, in rich Attire,
 Because I love the Kitchen Fire,
 Do seem t' abhor my Touch;
 What tho' I'm greasy now and then,
 To tell the Truth—these very Men
 In secret like me much.
 When Summer's Season glads the
 Year
 I'm such a Fright I scarce appear,

I'm worn so thin and pale;
 In Winter's Frost and dreary Sleet,
 Young *Roger* at the *George* I meet,
 And drink a Pot of Ale.
 Now Ladies to conclude my Story,
 —Of this strange Case here laid before
 I boldly dare proclaim, [you,
 That, tho' deform'd and shrivell'd
 grown, [brows,
 My fair Complexion chang'd to
 You'd gladly bear my Name.

IV. Ænigma 395. by *Enira*.

Me and my Parent differ more,
 Than Sixe and Son e'er did before.
 I've no more Likeness to my Mother,
 Than a Moon and Horse have to each
 other.
 Her Limbs are lusty, stout and strong,
 Her Ears are large, her Tail is long.
 I have not, Ladies, let me tell ye,
 Nor Head, nor Tail, nor Back, nor
 Belly,
 Nor Tongue; can neither grin nor
 chatter:
 A Mute unactive Mass of Matter.

My Form, 'tis true, is not the same,
 As when I from my Parent came;
 The Tortures I have undergone,
 Indeed might melt a Heart of Stone.
 Racks and Imprisonment I bore,
 Till Sweat distill'd, at ev'ry Pore.
 When from my Prison-house releas'd,
 By some I'm hated, some caref's'd.
 The Chaplain (sure 'tis Want of
 Grace)
 Grumbles to see me shew my Face;
 Tho' once he might behold in me,
 An Emblem of Eternity.

V. Ænigma 396. by Mr. *J. Nunn, Junior*.

Ye lovely *Fair*, who can dark
 Things reveal,
 And heal the Smart that wounded
 Lovers feel; [tell
 Lend your Attention, whilst I briefly
 My Parentage, my Form, and how I
 dwell. [come,
 A Slave to *Man*, I in the World did
 By cruel Hands torn from my Mo-
 ther's Womb; [told
 Compell'd to pass thro' *Fire*, as we are
 The Children to stern *Moloch* did, of old.
 My Shape is slender, but my Head
 is great, [to eat;
 Without a Tongue to talk, or Mouth
 But on my Head a Bandage may be
 found, [half way round.
 Which, like *Dick's* Hat-band, goes but
 Legs I have none, but, *Ladies*, let me
 tell ye

I oft do roll about 'pon Back and Belly:
 Yet, tho' I'm strong, I like a Fool am
 led [th' Head,
 By a mere *Shrimp*, who tugs me on by
 Supports my Motion, and directs my
 Way,
 As well in Darknes, as in open Day.
 In Great Men's Houses I am much
 caref's'd, [best;
 Where I am seen in Cloathing of the
 Which oft I change for other fresh
 Supplies, [Ones prize.
 Tho' what I thus cast off, e'en great
 My Station is oft low, sometimes 'tis
 higher, [the Fire.
 But my Employment's always near
 Enough is said for you to guess my
 Name—
 Then tell the World my Post, and
 who I am.

VI. Ænigma

VI. Ænigma 397. by Miss *Hoyden*.

To distant <i>India</i> , to <i>Great Britain's</i> Earth, [my Birth;	The <i>Virgin's</i> Blush indulgent I conceal, The <i>Lover's</i> Bliss, tho' conscious, ne'er reveal :
To Man, to Beasts, to Worms I owe Among the vegetable Race I spring ; Attend the Peasant, wait upon the King ;	By me assisted, <i>Jove</i> without Alarms From <i>Phebus</i> , had enjoy'd <i>Alcmena's</i> Charms : [Shade,
Of universal Use, the Court, the Stage, And sacred Temples, me their Friend engage :	Tho' <i>Adam</i> never knew my pleasing His Race, both Male and Female, court my Aid.

VII. Ænigma 398. by Mr. *Sam. Hodgkin*.

My Situation is in flow'ry Meads, Or where the Thicket oft extends its Shades ; [found,	Yet Care and Art do both combine to place, [human Race.
Sometimes upon a Rising Hill I'm And sometimes I am seen on level Ground ;	My wond'rous Form remote from Ye prying <i>Youtbs</i> , in mystic <i>Lines</i> explore What oft in <i>Woods</i> and <i>Groves</i> you've sought before.

VIII. 399. Ænigma by *Mewagissenfis*.

To form me completely in every Part,
Demands a due Share both of Labour and Art,
Yet by aukward *Pretenders*, my Nature mistaking,
And for want of true Judgment, I'm spoil'd in the making ;
Thus the Truth I confirm of what *Naturalists* say,
That hasty Productions soon turn to Decay.
When form'd by nice Rules (as I never appear,
Or visit my Friends but once in the Year)
To keep up *Decorum*, I alter my Dress,
To wait on the Ladies, I cannot do less.
I dare not go *naked*, for then those below me
Would claim an Acquaintance, and easily know me :
Like the hum'rous *Prince*, as in *Story* recited,
With appearing *incog*. I am highly delighted ;
So aukward a Form may the Ladies surprize,
When I tell them my Beauty consists in Disguise.

IX. Ænigma 400. by Mr. *Thomas Breaks*.

From diff'rent Creatures our Ex- istence rose, [compose ;	Sometimes we trace the Regions of the Air, [Sphere :
And diff'rent Substances our Parts Form'd by unerring Nature for Delight,	And oft' we glide within the watry No <i>Nymph</i> of <i>Nereus's</i> Hall, or <i>Tri- ton's</i> Bow'rs [our's ;
Ladies, like you, we're often seen in white ; [Iris shew,	Can boast a <i>Vehicle</i> more quaint than There safely shelter'd, a still Calm partake [Forests shake.
Tho' some of us more <i>Sireaks</i> than All patch'd and painted, like a modern <i>Beau</i> . [portray,	Tho' Billows rage, and Storms huge By Men to various Uses turn'd are we, Oft' made the Scourge of hateful In- famy,
Our curious Shape the Learned oft And <i>Newton's</i> Problems our great Worth display.	

And

And oft we're call'd to th' Tables | 'Tis you, ye Fair, who give the wound-
 of the Great ; | ing Stroke ; [cover,
 But oh ! we're tortur'd ere we gain | Tho' we, if Fancy err not, oft' dis-
 that State ; [broke, | The happy Man ordain'd to be your
 With cruel Blows our tender Sides are | Lover.

X. Ænigma 401. by Mr. J. Clarke.

What I am, Ladies, of you I de- [slain,
 mand, | Many are those that have by me been
 Whose Pow'r, like yours, is great o'er | Yet free from Marks of Violence they
 Sea and Land : [appear, | remain. [withstand ?
 In beauteous Robes I like you, too, | Who can the Sea's impetuous Force
 Brilliant's my Dress, my Jewels bright | Yet flowing Waves have stopt at my
 and clear ; [exceed, | Command : [Skill,
 But tho' in Power and Splendour I | But I've a Foe that baffles all my
 Few Lovers Hearts for me are known | And spoils the Wonders I perform, at
 to bleed ; [they fear, | Will ; [Hour,
 They fight not for me, yet my Power | Defaces all my Works, and in an
 And tremble often, soon as I appear ; | Leaves me bereft, at once, of all my
 Yet some, who like me better than | Power. [prize,
 the rest, | This mighty Foe of mine, you vastly
 Declare, of many Virtues I'm possess ; | And praise his Virtues to the very
 Nay you, ye rival Fair, who shun my | Skies ; [ed reign,
 Sight, [some Delight, | But there's a Place, where I unbound-
 Confess you view my Works with | Nor can my powerful Foe the Em-
 In Drawing I excel, such Land skips rise, | pire gain ; [troul'd ;
 As fill e'en you with Pleasure and | My Will is there both free and uncon-
 Surprise ; [know, | In midnight Darkness I the Sceptre
 Yet strange it is not, as my Pow'r you | hold. [my Name,
 You still should fly me, as your | Enough I've said, now, Ladies guess
 deadly Foe : | And when you've found it, tremble
 at the same.

PRIZE ÆNIGMA, by Mr. Anthony Moore.

(Whoever answers it before Candlemas Day, has a Chance for 10, and
 another for 8 Diaries.)

Fair Ladies, who in abstruse Riddles | So Ovid sings---and still I often prove
 deal, | Of Use to Lovers, and a Friend to Love.
 Attend, while I my Properties reveal. | But trust me not too far, ye beaute-
 Gentle as you, by Nature I appear, | ous Fair ! [beware !
 With Smiles you meet me, and with | Of your good Names, and Characters
 Pleasure hear. | For I to deal in Scandal, much am found,
 Deep Secrets are entrusted to my Care, | And in the Dark your Reputation
 And Court-Intrigues, and Politicks I | wound ;
 share : [Play, | Of Truth, the Nature, artfully disguise,
 At Church, at Balls, an Opera, or a | And vent my Spleen in Obloquy and
 Great is my Pow'r, and uncontroll'd | Lies ;
 my Sway : [Vain, | Hence in the sacred Page, my evil Name
 Gay Belles and Beaus, the Witty and the | Stands strongly branded with Reproach
 With Pleasure seek me, tho' they keep | and Shame. [to own,
 with Pain. [vey'd, | —Ladies permit me one more Truth
 I once Love's am'rous Embassies con- | 'Tis by your Sex that I am mostly
 Twixt a fond Lover, and as fond a Maid, | known.

Mr. W. Bayley, Mr. French Johnson, Mr. J. Langley, Umbra, T. V. and Mr. Cha. Underwood, have our Thanks, for the new *Ænigmas* sent by them, which (tho' very good ones) our Room will not, at present, permit us to insert---That by Mr. Underwood would have been printed in this Diary, had not another on the same Subject, not inferior, been first presented by a Lady. --- The *Ænigma* on Coals, sent under the Name of *Oedipus*, was copied from the *Traveller's Magazine* for May 1748. We could not have believed that a Person of some Reputation in the World, whom we have more than once endeavoured to oblige, would have submitted to act in this Manner. Such a Proceeding has not only a Tendency to injure the Compiler in the Eyes of the Publick, but is a manifest Injustice to the Contributors themselves, by depriving them of that Room to which they have a Right, and for which so many ingenious Persons of both Sexes are Competitors.

NEW QUÆRIES, REBUSSES, &c. to be ANSWERED
in the next Year's Diary.

Quære I. by *Cælia*.

WHY do Men often marry for Beauty, Women seldom ?

Quære II. by *Enira*.

Why do Beasts swim naturally, Mankind not ?

Quære III. by Mr *James Giles*.'

Why does a *Razor*, after being heated in hot Water, cut better than when cold ?

Quære IV. by *T. B.*

Whether the Man who has a great deal to Hope, and whose Hopes are well grounded, is not more happy than he who is arrived at the Height of his Expectations, and has nothing farther to hope or fear, beyond the unavoidable Incidents attending human Nature ?

A Rebus by Mr. *J. Fletcher*.

If you to the Name of a Part of a Swine,
The Name of a Water you properly join;
You thence may discover the Name of a Town,
Which, for its great Traffic, is much in renown,

Another by Mr. *W. Litson*.

Take a Produce of Linen, reverse a Denial,
If to find where I dwell you please to make Trial.

A Paradox by Mr. *Rich. Gibbons*.

In which the Prize *Ænigma*, and both *Rebus*'s in the last *Diary*, are answered.

Exact at Twelve o'Clock i'th'Day,	I then to <i>Toddenham</i> withdrew,
With Rod and Line, I took my Way,	And by the Way an <i>Adder</i> slew,
To angle in a Brook ;	That swell'd like any Dragon:
Where I no sooner cast my <i>FLY</i> ,	I drest my Fish, pick'd ev'ry Bone;
But Sport presented instantly,	All this perform'd before 'twas Noon;
And a fine Trout I took.	Enough I think to brag on!

We are requested, by a *Lady*, to give Place to the following *Catalogue of Birds*; whereof she desires an Explanation.

1. The Scene of heroic Actions and the Welcome of a Friend.
2. A Dish for an *Epicure* and an Emblem of Innocence.
3. The Governor of a Nation and an industrious Subject.
4. A beautiful Colour and a Breaker of Heads.
5. The Refort of wild Beasts and the Fashion of a Hat.
6. A filly Fellow.
7. A Machine.
8. An Implement useful to labouring Men.
9. That which ascends by means of its Tail, and flies without Wings.
10. An Emblem of a wanton Wife.
11. A Term of Equality, and Dissemper fatal to Sheep.
12. A Term expressive of a Horse, and a troublesome domestic Animal.

ANSWERS to the MATHEMATICAL QUESTIONS
in the last Year's Diary.

I. QUEST. 406, answ. by Master Jonath. Kimbell of Leicester-

John chang'd ten Sheep, at ten * a Piece,
For eight small Pigs and eighteen Geese.

The same answered by Mr. T. Barker of Westball in Sussex.

Let x denote the Number of Pigs, and y the Price of a Pig; then will $x + 10$ be the Number of Geese, and $2x - 6$ the Number of Sheep; and therefore, by the Question, $xy + \frac{x+10}{x} \times 2 = 100$, and $2x - 6 \times y + 2 = 100$. From the first Equation $y = \frac{80}{x} - 2$; and from the second $y = \frac{100}{2x - 6} - 2$; therefore $80 \times \frac{1}{2x - 6} = 100x$: whence $x = 8$, and $y = 8$. Therefore there were 8 Pigs, 10 Sheep, and 18 Geese.

The same answered by Mr. *Tho. Wilkin.*

Let x = Number of Pigs; then $x + 10$ = Number of Geese, and $2x - 6$ = Number of Sheep; whence $2x + 20$ = Price of all the Geese; $100 - 2x - 20$ ($= 80 - 2x$) = Price of all the Pigs; and $\frac{80 - 2x}{x}$ ($\frac{80}{x} - 2$) the Price of one Pig; and consequently $\frac{80}{x}$ ($=$ the Price of one Sheep) which multiplied by the Number of Sheep gives $\frac{80}{x} \times 2x - 6 = 100$:

Hence $160x - 480 = 100x$; and $x = 8$. Therefore there were 8 Pigs at 8 Shillings each; 18 Geese at 2 Shillings each; and 10 Sheep at 10 Shill. each.

In the same Manner it was also answered by Mr. G. Armstrong, Mr. W. Baxter, Mr. J. Beresford, Mr. Turner Boston, Mr. G. Crabbe, Darcy Donought, Mr. Jos. Farrington, Mr. T. Fletcher, Mr. Ja. Giles, Mr. E. Griffiths, Mr. J. Hamplon, Mr. W. Harvey, Mr. G. Hicks, Mr. J. Hudson, Mr. T. Hudson, Juvenis, Mr. W. Lee, Mr. W. Litson, Mr. Jos. Lord, Mr. B. Lydal, Mr. R. Marsh, Mr. R. Morris, Mr. W. Patrick, Mr. W. Rippon, Mr. Alex. Rowe, Mr. T. Sandling, Mr. W. Stoker, Miss S.T. Mr. W. Terrell, Mr. R. Terry, Mr. W. Thompson, Mr. J. Vicary, Mr. R. Walton, Mr. J. Woolcott, and several others, as may be seen by the Catalogue.

II. QUESTION 407, answered by Mr. *Abr. Botham.*

Construction. From the Vertex B, of the Triangle, through the given Point D, draw BDP; to which, from A, apply AP equal to the Base AC; draw DF, FG, GH parallel to AP, AC and FD, respectively; and the Thing is done.

For, by similar Triangles, $AP : FD :: BA : BF :: AC : FG$; but $AP = AC$ (by Constr.) whence $FD = FG$.

The same answered by Mr. *T. Peart.*

Draw BD from the Vertex to the given Point D; and make AM parallel thereto, and equal to the Base AC of the Triangle; draw MD cutting AB in F; then draw FG and GH parallel to AC and DF; for the other Sides of the Rhombus.

Demonstration. Let BD cut FG in N. The Triangles ADM and DFN (because of the Parallel Lines) will be similar; whence $AM (AC) : DF :: AD : FN :: AC : FG$; and consequently $DF = FG$.

Method of Calculation. From AB, AD, and the Angle DAB, the Angle BDC (= MAD) will be known; from which and the given Sides AD and AM, the Angle ADF will also be known, and consequently the Side DF.

An Algebraic Solution to the same, by Mr. *W. Smith of Irthlingborough.*

Put $AB = b$, $AC = c$, DQ (perp. to AB) = d , $BQ = e$, and $DF (= FG) = x$: Then $c : b :: x (FG) : BF = \frac{bx}{c}$; whence $FQ = c - \frac{bx}{c}$, and consequently $e - \frac{bx}{c} + d^2 = x^2$: Which, solved, gives $x = \frac{bce}{cc - bb}$

$$+ \sqrt{\frac{c^2 \times dd + ee}{cc - bb} + \frac{bce^2}{cc - bb}}$$

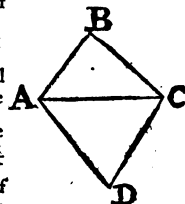
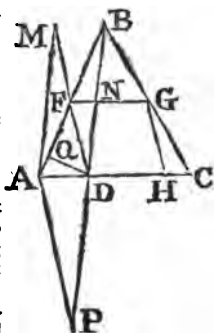
According to the former of these Methods, the Problem was constructed by Mr. *O'Cavanah*, *Philo Pefos*, Mr. *E Rollinson*, Mr. *Walter Trott*, and Mr. *H. Watfon*. — Algebraic Solutions to the same have also been received from Mr. *S. Bamfield*, Mr. *W. Baxter*, *Bircbouverensis*, Mr. *L. Charlton*, Mr. *J. Vicary*, and many others.

III. QUESTION 408, answered by Mr. *Will. Kingston of Bath.*

Since, by a well known Theorem, the Area of the Triangle ABC is $\frac{1}{4} \sqrt{BC + BA}^2 - AC^2 \times$

$AC^2 - BC - BA^2$, if AC be put = x , we shall (because BA is given = 9, and BC = 10) have

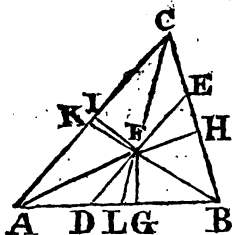
$ABC = \frac{1}{4} \sqrt{361 - xx \times xx - 1}$. And in the very same Manner, the Area of ADC will be = $\frac{1}{4} \sqrt{529 - xx \times xx - 1}$: Which being to that of ADC as 5 to 3 (by the Quest.) it is evident that



25 : 9 :: 529 — xx : 261 — xx ; whence $xx = 266,5$; and the Area $ABC = \frac{1}{2} \sqrt{94,5 \times 265,5} = 39,5994$: and consequently, $39,5994 \times \frac{8}{3} = 105,5984$ ($\approx 10 A. 2 R. 9 P.$) is the Content of the Field.

In the very same manner it is answered by Mr. *Ja. Beresford*, Mr. *J. Boston*, Mr. *Abr. Borham*, and Mr. *W. Trott*.—It was also truly and concisely answered by Mr. *W. Allen*, Mr. *S. Bamfield*, Mr. *T. Barker*, Mr. *W. Baxter*, Mr. *Jos. Farrington*, Mr. *J. Fletcher*, Mr. *R. Flitcon*, Mr. *Ja. Giles*, Mr. *J. Hampson*, Mr. *G. Hicks*, Mr. *J. Hudson*, Mr. *W. Smith*, Mr. *W. Stoker*, Mr. *W. Terril*, Mr. *R. Terry*, Mr. *W. Thompson*, Mr. *J. Vicary*, Mr. *T. Wilkin*, Mr. *J. Woolcott*; and several others:

IV. QUESTION 409, answered by *Birchovenensis*.



When $FG \times FH \times FI$ is a *Maximum*, the Product thereof by the constant Quantity $\frac{1}{2} AB \times \frac{1}{2} BC \times \frac{1}{2} AC$, will also be a *Maximum*; that is, the Product of the three Parts ABF , BCF , and ACF of the given Triangle, will be a *Maximum*, and consequently those Parts equal among themselves; since it is evident (from *Eu. 5. 2.*) that the continual Product of the Parts of any given Quantity (whatever their Number is) will be the greatest, when the Parts are all equal. Therefore, ABF being $= \frac{1}{3} ABC$, it is evident that FG will be $= \frac{1}{3}$ of the Perpendicular falling from C upon AB , &c. and consequently, that F will be the Center of Gravity of the given Triangle ABC . Hence the three required Perpendiculars are found to be 5,2915; 4,4095; and 6,6143; and their continual Product $= 154,33$. *W. W. R.*

The same answered by Mr. *Walter Trott*,

From any Point F , in DE parallel to one Side AC of the Triangle, conceive Perpendiculars FG , FH , and FI to be let fall; then FG being in a constant Ratio to DF , and FH to FE , it is evident, that, when $DF \times FE$ is a *Maximum*, $FG \times FH$, or $FG \times FH \times FI$ (because FI is supposed to continue the same) will likewise be a *Maximum*; which, therefore is known to be when $FD = FE$, or when $AK = CK$, supposing the right Line BK drawn meeting AC in K . Hence it appears that (let the Distance between DE and AC be what it will) the Quantity $FG \times FH \times FI$ cannot be a *Maximum*, unless $AK = AC$: Neither can it be a *Maximum* (by the very same Argument) unless AL (supposing CFL drawn) is $= BL$: Therefore it must be so, when $AK = AC$, and $AL = BL$: Whence the Construction is manifest; the Point F required being the Center of Gravity of the Triangle, and the three required Perpendiculars equal to $\frac{5}{3} \sqrt{7}$, $2 \sqrt{7}$, and $\frac{5}{2} \sqrt{7}$, or 4,4096; 5,2915; and 6,6144; and the Content of the Solid contained under them $= \frac{175}{3} \sqrt{7} = 154,33$ Cubic Inches.

A Fluxionary Solution to the same, by Mr. J. Honey.

Let $AD = 62 = a$, $BD = 38 = b$, $CD = 50 = c$, and $AB = x$; then $a + b : c - b :: a - b : x - b$ = Diff. Segments of the Base;

whence, putting $a - b = z$, we get $\frac{x - z}{2z} = IB = DF$; and

(p. 47. 1 Es.) $BF = \sqrt{\frac{4b^2x^2 - x^4 + 2zx^2 - z^2}{2z}}$; also $CF =$

$\sqrt{\frac{4c^2x^2 - x^4 + 2zx^2 - z^2}{2z}}$; and consequently $BC = \sqrt{\frac{r^2x^2 - x^4 - z^2}{2z}}$

$+ \sqrt{\frac{mx^2 - x^4 - z^2}{2z}}$, by putting $r = 4bb + 2z$, and $m = 4cc +$

$2z$. Hence $\sqrt{r^2x^2 - x^4 - z^2} + \sqrt{mx^2 - x^4 - z^2} = 4$ Times the Area ABC ; whose Fluxion being taken and made $= 0$, we thence

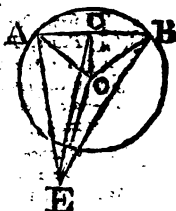
get $x^4 - \frac{mr + 4z}{m + r} x^2 = -z^2$; solved $x = 78,3435$ Perches:

Whence $AC = 73,5223$, and the Area $ABC = 18$ Acres.

By this last Method, and the same Substitution, the Problem is also answered by Mr. W. Allen, Mr. Abr. Bottem, Mr. L. Charlton, P. novius, and Mr. W. Spicar; whose Solutions are equally neat with that above. Mr. Peart (who gives the Solution without Fluxions) says the Angles EAD and BCD must be equal to each other; the Truth of which is evident from the foregoing Construction: For BED , which is $= BAD$, must necessarily be $= BCD$, standing on the same Arch BD .

VI. QUESTION 411 answered by Mr. L. Charlton.

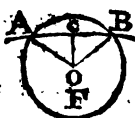
LET O be the Center of the Iris, E the Eye of the Spectator, and $EACB$ the Plane of the Horizon: Then, if AE be taken as the Radius, it is evident (from the Writers on Optics) that OA will be the Sine of an Angle ($AE O$) of $40^\circ 17' = ,6465$; from whence and AC , which is given $= \text{Sin. } 30^\circ = ,5$, OC is found $= ,4099$. Then in the Triangle EOC (right-angled at O) it will be, as $EO (= ,7628 = \text{Cof. } 40^\circ 17')$ is to OC , so is $\text{Rad. } (1)$ to the Tang. of $OEC = 28^\circ 15' =$ the Depression of the Center of the Bow, or the Sun's Altitude: From which the Time is found 3 h. 15 m. Afternoon.



The same answered by Mr. Samuel Bamfield.

The Arch (AO or BO) of a Great Circle of the Sphere, drawn from the interior Side of the Bow ABF to the Center thereof, is (according to the Writers on Optics) $= 40^\circ 17'$: Therefore in the

isofceles spherical Triangle AOB (where AB represents the Horizon) we have given $AO = OB = 40^\circ 17'$, and $AB = 60^\circ$; whence the perpendicular OC (= the Sun's Altitude) is found = $23^\circ 15'$; and from thence the Time of Observation 3 h. 15 m. Afternoon.



VII. QUESTION 412 answered.

Making $a = 1734$, $b = 2850372$, and $c = 3240960$, we have $v + y = a - 2x$, $v^2 + y^2 = b - 2x^2$, and $vy = \frac{c}{x}$. From the Square of the first of which Equations subtract the Double of the last, so shall $v^2 + y^2 = a^2 - 4ax + 4x^2 - \frac{2c}{x} = b - 2x^2$; and consequently $x^4 - \frac{2ax^3}{3} + \frac{aa - b}{6}x^2 = \frac{c}{3}$; that is, $x^4 - 1156x^3 + 26064x^2 = 1080320$: Whence $x = 8$; $v = 1688$; $y = 30$; and the Time of the Proposer's Birth, *Oct.* 30, 1688, 8 Hours *P. M.*

Thus the Problem was answered by Mr. *W. Allen*, Mr. *O. Armstrong*, Mr. *S. Bamfield*, Mr. *T. Barker*, Mr. *W. Baxter*, Mr. *Tbo. Baxtonden*, Mr. *J. Beraford*, *Birchouvenensis*, Mr. *Abr. Botham*, Mr. *J. Bosson*, Mr. *L. Charlton*, Mr. *G. Crabbe*, Mr. *R. Flitton*, Mr. *T. Fleischer*, Mr. *J. Goodbend*, Mr. *E. Griffiths*, Mr. *W. Harrison*, Mr. *G. Hicks*, Mr. *J. Honey*, Mr. *J. Hudson*, *Juvenis*, Mr. *W. Kingston*, Mr. *B. Lydal*, Mr. *T. Pears*, *Penowius*, Mr. *Alex. Rowe*, Mr. *W. Smith*, Mr. *W. Spicer*, Mr. *W. Stoker*, Mr. *W. Terrill*, Mr. *R. Terry*, Mr. *W. Thompson*, Mr. *W. Trott*, Mr. *M. Ward*, Mr. *T. Wilkin*, and Mr. *J. Woolcutt*; of none of whom, in particular, we have a Right to ascribe the Solution here put down.

VIII. QUESTION 413 answered.

Messrs. *Barker*, *Bowil*, *Birchouvenensis*, *Botham*, *Juvenis*, *Honey*, *Pears*, *Penowius*, *Smith*, and *Trott*, solve this Problem by substituting for the Half-Sum, and the Half-Difference of the Quantities sought in the several given Equations: Thus, Let $w = s + d$ and $x = s - d$; then the two first Equations ($w^2 + x^2 = 89$ and $wx + w + x = 53$) will become $2s^2 + 2d^2 = 89$, and $s^2 - d^2 + 2s = 53$; whence $s + d = 48\frac{1}{2}$, and $s = 6\frac{1}{2}$: Therefore $d (= \sqrt{44\frac{1}{2}} - s) = 1\frac{1}{2}$, $w = 8$, and $x = 5$.

Again, By making $x = s + d$, and $y = s - d$, the 3d and 4th Equations ($xx + yy = a \times x + y$, and $x^3 + y^3 = b \times x^2 + y^2$) will be $2s^2 + 2d^2 = 2as$, and $2s^3 + 6sd^2 = b \times 2s + 2dd = b \times 2s$ (a being $18\frac{1}{6}$, and $b = 18\frac{7}{81}$): Whence $d^2 = s - s = \frac{1}{3}ab - \frac{1}{3}s^2$, and $s = -\frac{1}{2}a \pm \sqrt{\frac{1}{4}a^2 - \frac{1}{3}ab}$; and $d (= \pm \sqrt{as - s^2}) = \pm 9$; there-

fore

fore $x = 10 + 9$, and $y = 10 - 9$; that is, the greater Number will be 19, and the lesser 1; but which of these x must be, depends on the

other given Equation $\frac{x^5 + y^5}{x \times x + y \times y} = 2 \frac{1}{2}$; which Equation, by substituting in like manner ($u = s + d$, and $v = s - d$) becomes $\frac{s^4 + 10s^2d^2 + 5d^4}{s^2 - d^2} = 2 \frac{1}{2}$; whence $s^4 + 3,64s^2d^2 = 1,44s^4$;

Now, by completing the Square, and taking the Root, $d^2 = 0,36ss$, and $d = \frac{6s}{10}$: Therefore $x (= s + d) = s + \frac{6s}{10}$; whence $s = \frac{10x}{4}$;

also $d (\frac{6s}{10}) = \frac{8x}{4}$; and consequently $s (1 + d) = \frac{16x}{4} = 4x = 4$ or 78. But, if s be taken as the lesser of the two Numbers, it is evident that, then, $x = 4s$, or $s = \frac{x}{4}$, that is, $s = \frac{1}{4}$, or $\frac{19}{4}$; but, of these four different Values of s , the first only can fulfil the Conditions of the Problem: So that the five Numbers required will be 4, 5, 1, 19, and 8; and the Letters corresponding D, E, A, T, H.

Another Answer to the same, by Mr. H. Watſon.

1. By adding the Double of the second Equation to the first, we have $w + x + 2 \times w + x = 195$; whence $w + x = \sqrt{196} - 1 = 13$: From which, and $w^2 + x^2 = 89$, the greater Number is found $= 8$, and the lesser $= 5$.

2. By multiplying together the third and fourth Equations, we have $\frac{x^2 + y^2}{x + y} = ab$, that is, $x^2 - xy + y^2 = ab$ (a being $= 18 \frac{1}{4}$, and $b = 18 \frac{1}{8}$): The Double of which, taken from the Triple of the third Equation, $x^2 + y^2 = a \times x + y$, gives $x^2 + 2xy + y^2 = 3a \times x + y - 2ab$, or $(x + y)^2 = 3a \times x + y - 2ab$; whence $x + y = \frac{3a}{2} + \frac{1}{2} \sqrt{9aa - 8ab} = 20$: From which, and $x + y = 13 \frac{1}{2}$ ($x = 16$), the greater Quantity is found $= 19$, and the lesser $= 1$.

3. It is plain that $\frac{u^4 + x \times u^4 - u^3x + u^2x^2 - ux^3 + x^4}{u^5 + x^5} = \frac{u \times u \times (u + x)^3}{u^5 + x^5}$; and consequently $u^4 - u^3x + u^2x^2 - ux^3 + x^4 = 2,05ux \times \frac{u^2 + 2ux + x^2}{u^2 + x^2}$, that is, $u^4 - u^3x + u^2x^2 - ux^3 + x^4 = 2,05ux \times \frac{u^2 + 2ux + x^2}{u^2 + x^2}$, or $u^4 - u^3x + u^2x^2 - ux^3 + x^4 = 5,1u^2x^2$, whence, by completing the Square, and extracting the Root, $uu + xx = 1,525ux = 2,725ux$; and therefore $uu - 4,25ux = -xx$; and, by completing the Square again, $u =$

$4,225 = \pm 2,750 = 4 \times 687 \frac{1}{2}$ that is, $4 \times 687 \frac{1}{2}$ or $\frac{10}{4} \times 687 \frac{1}{2}$ but the first of these Values must be the required one; and the Letters, answering the Conditions of the Problem, D, E, A, T, H.

Oth cruel Case! how fix'd the Grief!

When DEATH alone can yield Relief.

Mr. W. Allen and Mr. Lionel Charlton, by substituting for the Sum and Product, in each Case, bring out the same Conclusion from the Resolution of *Quadratics* only.—Many Contributors have answered all the Equations, except the last, by Means of *Quadratics*.

IX. QUESTION 414 answered by the Proposer, Mr. Rollinson.

SINCE the Stress or Pressure upon the Prop

ED is (by Mechanics) as $\frac{1}{BF}$ (supposing

BF perpendicular to ED), the Force in the perpendicular Direction, whereby the

Beam tends to break at E, will be as $\frac{1}{BE}$ (it

being to the absolute Force, in the Direction

DE, as BE to BF). But the Strength of (or the whole Force ne-

cessary to break) the Beam at E, is known to be as $\frac{1}{AE \times BE}$; which

is to $\frac{1}{BE}$ the Force above-mentioned, in the Proportion of $\frac{1}{AE \times BE}$

to $\frac{1}{AE \times BE}$, or of 1 to AE; whence (by the Question) AE is to

be a *Minimum*, and consequently BE a *Maximum*: But BE is to the Sine of the Angle D in the given Ratio of ED to the Sine of D; whence it is evident that BE will be a *Maximum* when the Sine of D is so, or when D itself is a Right-Angle.—Therefore, having made BK perpendicular to BC and \pm the given Length of DE, draw KE parallel to BC, meeting AB in E, so shall E be the Place where the End of the Prop must stand.

Much after the same Manner the Problem was solved by Mess. Bosham, Charlton, Holliday, Trutt, and Watson; all of whom determined the Angle BDE to be a right one.

X. QUESTION 415 answered by Mr. W. Bevil.

LET $S = 2000$ = the Sum proposed; $r (1.05)^n$ = the Amount of 1*l*. in one Quarter, and n = the Number of Quarters required; then the Amount of the Sum S will be Sr^n , and the Amount of all the quarterly Payments (exclusive of that due at the End of n Quarters) = $1 + 2r^n + 3r^{2n} + 4r^{3n} + 5r^{4n} + 6r^{5n} + 7r^{6n} + 8r^{7n} + 9r^{8n} + 10r^{9n} + 11r^{10n} + 12r^{11n} + 13r^{12n} + 14r^{13n} + 15r^{14n} + 16r^{15n} + 17r^{16n} + 18r^{17n} + 19r^{18n} + 20r^{19n}$ continued to $n - 1$ Terms; the Sum of all which will be found =

$\frac{r^n}{r-1} \times s$ and consequently the Money then owing = $Sr^n - \frac{r^n}{r-1} \times s$; whereof the Interest

for one Quarter is $r-1 \times Sr^n - \frac{r^n}{r-1} \times s$; and

this, by the Nature of Question, must be equal to rs (the Sum s paid at the End of n Quarters, and its Interest for the same Quarter); Hence

we have $\frac{r^n}{r-1} \times S - \frac{r^n}{r-1} \times s = rs$, and $n = \frac{\text{Log. } s}{\text{Log. } r} = 28,99$

(s being put equal to $\frac{r^n}{r-1} = 1,43233$): Therefore at the End of twenty-nine Quarters the Debt will be the greatest possible (the Moment before the twenty-ninth Quarter is paid).

See *Turner's Mathematical Exercises*, No. 2.

The same answered by Mr. Hugh Brown.

Put $s = 2000$, $r = 1,05$, $r^n = 1,0122723$, &c. and n the Number of Quarters at the End of which the Debt will be the greatest; then (by the Question, and known Principles) $ar^n - a - 1 = 2r^n - 2$

$- 3r^n - 3 \dots - n - 1 \times r = ar^n + \frac{r^n - 1}{r - 1}$

a Maximum. Therefore $a \times r^n = \frac{r^n - 1}{r - 1} \times r^n \times \frac{r^n - 1}{r^n - 1}$

n being = $(,0121975)$ the hyperbolic Log. of r : Whence $r^n =$

$\frac{\text{Log. } 1,43233}{\text{Log. } 1,05} = 1,43233$, &c. and $n = \frac{\text{Log. } 1,43233}{\text{Log. } 1,05} =$

$29,45$, &c. Hence, as the Answer by the Nature of the

Question is restrained to a whole Number, it is manifest, that at the End of twenty-nine Quarters (the Moment before the Payment then due, is made) the Debt will be the greatest possible.

Messrs. Bamfield, Birchbourns, Bosham, Robinson, Smith, Trott, Watson, and some others, also answered this Question, in a concise and elegant Manner.

XI. QUESTION 416 answered by Mr. E. Rollinson.

THE Probability of missing a Head n Times together, with a single Halfpenny, being $\frac{1}{2}^n$, the Probability of throwing any Halfpenny a Head, in n Tryals, will therefore be expressed by $1 - \frac{1}{2}^n$; and consequently that of throwing all 12 assigned Heads, in n Tryals, = $1 - \frac{1}{2}^{12n}$ (for the Throwing all the 12 Heads may be considered as

12 independent Events; since the Happening of some of these, sooner or later, ^{will} influence the Happening of the others). Hence, by the Conditions of the Problem, we have $1 - \left(\frac{1}{2}\right)^x = \frac{1}{2}$; and

consequently $x = \frac{\text{Log. } 1 - \left(\frac{1}{2}\right)^{\frac{1}{2}}}{\text{Log. } \frac{1}{2}} = 4.155$, the Number of Throws

required; which, not being an Integer, shews there can be no exact Equality of Chance in the Case proposed; 4 being a small Matter too little, and 5 considerably too great.

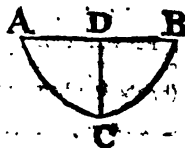
Corol. It appears from hence that the exact Odds of bringing up all the Heads of any Number (n) of Halfpence, in x Throws, will be as $1 - \left(\frac{1}{2}\right)^n$ to $1 - 1 - \left(\frac{1}{2}\right)^n$, universally.

In this Manner it was also answered by Mr. O'Connell, and Mr. Mos, the Proposer.

XII. QUESTION 417 answered by Mr. Lionel Charlton.

IF half the Length of the Chain or Curve (AC or BC) be denoted by x , then will the Abscissa DC $= \sqrt{aa + xx} - a$, and the given Semi-Ordinate AD ($= c$) $= a \times \text{Hyp.}$

$\text{Log. } \frac{a + \sqrt{aa + xx}}{a}$ (See Landen's Mathe-



matical Lucubrations, p. 34). Moreover, by Mechanics, the Strefs or Force upon both the Pins, at A and B, will be to the Weight of the Chain, as the Radius

is to the Sine of the Angle A or B, that is, as $\frac{a}{\sqrt{aa + xx}}$ to $\frac{x}{\sqrt{aa + xx}}$,

or as $2x$ to $2\sqrt{aa + xx}$: Therefore, the Weight of the Chain being as the Length $2x$, the Strefs upon the Pins will consequently be, as $2\sqrt{aa + xx}$; which Quantity is to be a Minimum, by the Question: From whence, and the above Equation, $c = a \times \text{Hyp. Log. } \frac{a + \sqrt{aa + xx}}{a}$, both the Values of a and x will be found; for the

$\text{Hyp. Log. } \frac{a + \sqrt{aa + xx}}{a}$ being $= \frac{c}{a}$, supposing N to denote the

Number while $\text{Hyp. Log.} = 1$, it is evident that $N^a = \frac{a + \sqrt{aa + xx}}{a}$;

whence, by Reduction, x is found $= \frac{1}{2} a N^2 - \frac{1}{2} a N^{-2}$, and from

thence $a\sqrt{aa + xx} = a N^a + a N^{-a}$: This, in Fluxions, &c. given

gives $aN^2 = \frac{c^2}{a} N^2 = \frac{c^2}{a} \left(\frac{v+1}{v-1} \right)^2 = s$; whence $N^2 = \frac{c+a}{c-a}$, or $N^2 = \frac{v+1}{v-1}$ (by putting $s = \frac{v+1}{v-1}$); which (in Logarithms) becomes $2v = \text{Hyp. Log. } \frac{v+1}{v-1}$; whence $v = 1,1996$; and from thence $s = 6 \times 1,8436 = 11,0616$, and $2s$ (A.C.B.) = $22,1232$ = 12,578.

The same answered by Penovius.

Let (AC) half the Length of the Chain = s , AD (BD) = b , and DC = a ; then will $b = s \times \text{Hyp. Log. } \frac{s + \sqrt{aa + ss}}{a}$ by the

Property of the Curve. Also as x ($\frac{2x}{\sqrt{aa + ss}}$) : x (half the Chain) : $\sqrt{aa + ss}$ = the Stress on each Pin, which put = s ; then, by exterminating x , we have $\frac{b}{a} = \text{Hyp. Log. } \frac{s + \sqrt{ss - aa}}{a} = \text{Hyp. Log. } \frac{s + \sqrt{ss - aa}}{a} = \text{Hyp. Log. } \frac{s + \sqrt{ss - aa}}{a}$; whereof the Eluxion, when s is a Minimum, will be $-\frac{bs}{aa} = \frac{bs}{\sqrt{ss - aa} \times s + \sqrt{ss - aa}}$.

whence, by Reduction, $s = \frac{aa}{\sqrt{bb - aa}}$; Therefore $\sqrt{ss - aa} = \frac{aa}{\sqrt{bb - aa}}$, and $s + \sqrt{ss - aa} = \frac{aa + aa}{\sqrt{bb - aa}} = \frac{2aa}{\sqrt{bb - aa}}$;

which Value, substituted above, gives $b = \text{Hyp. Log. } \frac{2aa}{\sqrt{bb - aa}}$;

$a \times \text{Hyp. Log. } \frac{b+a}{b-a} = \text{Hyp. Log. } \frac{b+a}{b-a} = 2b$; Whence $s = 6,2708$ and from thence (A.C.B.) = $12,5416$ = 12,578.

Corol. Hence the Length of the Chain A.C.B. (when the Stress is a Minimum) is to the given Distance of the Tacks A, B, as 1,2578 to 1; and the Stress on the Tacks is to the Weight of the Chain, as 1,1996 to 1, or as 6 to 5, nearly.

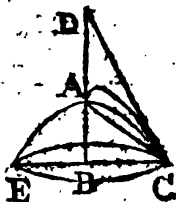
This Question was also answered, in an elegant Manner, by Mr. O'Connell, Mr. W. Bevil (the Proposer), Mr. E. Rollinson, and Mr. H. Watson.

XIII. QUESTION 418 answered by Mr. Peart, the Proposer.

FROM the Equation $ss = 2ax + x^2$ of the generating Curve, the Surface of the Mountain A.E.C. is easily found to be

46 X

4c X 35 = ax (where $c = \frac{3,1416}{2}$), which being
given = 455, we thence have (by completing
the Square) $y = 70x + \sqrt{\frac{1}{4}c^2 x^2 - 455x} =$
 $\frac{1}{2}c\sqrt{2ax + xx} + \sqrt{\frac{1}{4}c^2 \times 2ax + xx - 455x}$;
but y is also = $a \times \text{Hyp. Log. } \frac{a+x+\sqrt{2ax+xx}}{a}$



(by Property of the Curve): From which
equal Values, by substituting $ax = a$, we have $\frac{1}{2}c\sqrt{2u+1} +$
 $\sqrt{\frac{1}{4}c^2 \times 2u+1 - 455} = \text{Hyp. Log. } \frac{u+1+\sqrt{2u+1}}{1}$; whence

u is found = 1,779 $\frac{1}{2}$, and from thence $y = 1,8078x$. Having,
therefore, made BC to AB in the given Proportion of 1,8078 to 1,
and taken AD = the Right-Line AC = 2,066 x , let CD be drawn,
which (because the Range is a Maximum) will be the Line of Direction.

Now let r = the Earth's Semi-Diameter, in Feet; $b = 16 \frac{1}{2}$ Feet;
and t = the Number of Seconds in 24 Hours: Then it will be as r^2

$+ x : : t : \frac{1}{2} \frac{t^2}{r}$ = the Seconds taken up in performing an equal
Number of Vibrations by the Pendulum on the Top of the Mountain:

Therefore $\frac{t^2}{r}$ is the Time of the Ball's Flight; and consequently $\frac{t^2 x^2}{r^2}$

$\times b = 2,066x (= AD)$; whence x is given = $\frac{2,066rr}{b t^2} = 7598$ Feet,

the Mountain's Height; and the Time of Flight $(\frac{t^2}{r}) = 38,24$ Se-

conds: By which Number dividing CD (= 27046), the Quotient 263 $\frac{1}{2}$
Feet will be the Velocity, per Second, with which the Ball is discharged.

In this Solution I have supposed the Gravitation to be proportional to
the Square of the Distance from the Earth's Center, inversely, without
having regard to the Attraction of the Mountain: But if this last
(which is to the former as the Height of the Mountain to the Semi-
Diameter of the Earth, nearly) be also taken into the Consideration,
the Time lost by the Pendulum on the Top of the Mountain will then

be only the Half of $(\frac{t^2}{r})$ what it is above found to be: Therefore the

Height of the Mountain will come out four Times as great here, as
when the Mountain's Attraction is neglected.

XIV. QUESTION 419 answered by Mr. R. Weston, the Proposer.

SINCE it appears, by what is done in the last Diary (p. 41), that
 $\frac{y^2}{x^2}$ may be substituted for j , if such Substitution be made in the

the given Equation, the required Value of x may then be readily obtained by the common Method of finding Fluents by infinite Series: Or that Value may be found in the following Manner:

Assume $x = b + fy + py^2 + qy^3 + ry^4$, &c. supposing that when y is $= 0$, x is $= b$, and $\frac{x}{y} = f$: Then the given Equation ($a^3 \dot{y} = a^2 \dot{y}^2 - y^2 \dot{x}^2$) being multiplied by the invariable Quantity \dot{x} , we have $a^3 \dot{x} \dot{y} = a^2 \dot{x} \dot{y}^2 - y^2 \dot{x}^3$; whence substituting for \dot{x}^3 its Value found by the assumed Equation, we have, after dividing by \dot{y}^2 , $\frac{a^3 \dot{x} \dot{y}}{\dot{y}^2} = a^2 \dot{x} - f^3 y^2 \dot{y} - 6f^2 p y^3 \dot{y}$, &c. Hence, by taking the Fluents, we find $-\frac{a^3 \dot{x}}{\dot{y}} = a^2 x - \frac{f^3 y^3}{3} - \frac{6f^2 p y^4}{4} - \frac{9f^2 q + 12f^2 p^2}{5} y^5$, &c.

But, x being $= b$, and $\frac{x}{y} = f$, when y is $= 0$, the correct Equation of the Fluents is $-\frac{a^3 \dot{x}}{\dot{y}} = -a^2 b - a^3 f + a^2 x - \frac{f^3 y^3}{3} - \frac{6f^2 p y^4}{4}$, &c. which, multiplying by $-\frac{\dot{y}}{a^3}$ and substituting for x its assumed

Value, becomes $\dot{x} = f \dot{y} - \frac{f y \dot{y}}{a} - \frac{p y^2 \dot{y}}{a} + \frac{f^2}{3a^3} \cdot \frac{1}{a} \times y^3 \dot{y}$, &c. whence, taking the correct Fluents, we get $x = b + f y - \frac{f y^2}{2a} + \frac{p y^3}{3a} + \frac{f^3 - 3a^2 q}{3 \cdot 4 a^3} y^4 + \frac{6f^2 p - 4a^2 r}{4 \cdot 5 a^3} y^5$, &c. Consequently, by comparing the two Values of x ; p , q , r , &c. will be known.

The same answered by Mr. Henry Watſon.

Put $\dot{y} = x \dot{x}$, then $\dot{y} = \dot{x} \dot{x}$; which Values being substituted in the given Equation, $a^3 \dot{y} = a^2 \dot{y}^2 - y^2 \dot{x}^2$, and the whole divided by \dot{x} , we have $a^3 \dot{x} = a^2 x^2 \dot{x} - y^2 \dot{x} = a^2 x^2 \times \frac{\dot{y}}{x} - y^2 \times \frac{\dot{y}}{x}$ (because $\dot{x} = \frac{\dot{y}}{x}$) and consequently $a^3 x \dot{x} = a^2 x^2 \dot{y} - y^2 \dot{y} = \frac{a^2 x^2 - y^2}{1} \times \dot{y}$: Put $w = a^2 x^2 - y^2$; then $x \dot{x} = \frac{w + y \dot{y}}{a^2}$, and $x \dot{x} = \frac{\frac{1}{2} w + \frac{1}{2} y \dot{y}}{a^2}$; and so, by Substitution, $a \times \frac{\frac{1}{2} w + \frac{1}{2} y \dot{y}}{a^2} = w \dot{y}$, or $\frac{1}{2} a w = w - a y \times \dot{y}$: Put now $w = w - a y$ ($= a^2 x^2 - y^2 - a y$) then $w = w + a y$, and $\dot{w} = w + a \dot{y}$; whence again, by Substitution, $\frac{1}{2} a \times \frac{w + a \dot{y}}{a^2} = w \dot{y}$, or $\frac{1}{2} a \dot{w} = w - \frac{1}{2} a a \times \dot{y}$, and therefore $\dot{y} = \frac{\frac{1}{2} a \dot{w}}{w - \frac{1}{2} a x}$; whereof the Fluent is $y = \frac{1}{2} a \times \text{Hyp. Log. } \frac{w - \frac{1}{2} a x}{a}$ (d being any constant

Quantity

Quantity at Pleasure) $\text{an } \frac{1}{2}a \times \text{Hyp. Log. } \frac{a^2x^2 - y^2 - ay - \frac{1}{2}aa}{d}$.

Hence, putting M $\text{an the Number whose Hyp. Log.} = 1$, we have

$$M^{\frac{2y}{a}} = \frac{a^2x^2 - y^2 - ay - \frac{1}{2}aa}{d}, \text{ and consequently } x^2 =$$

$$\frac{y^2 + ay + \frac{1}{2}aa + dM^{\frac{2y}{a}}}{a^2}; \text{ from whence } x \left(= \frac{y}{x} \right) =$$

$$\sqrt{\frac{y^2 + ay + \frac{1}{2}aa + dM^{\frac{2y}{a}}}{a^2}}; \text{ From which, when } d = 0, x \text{ will}$$

$$\text{be found} = a \times \text{Hyp. Log. } \frac{y + \frac{1}{2}a + \sqrt{y^2 + ay + \frac{1}{2}aa}}{a}, \text{ wherein}$$

c may be any constant Quantity at Pleasure.

In a Manner very little different from this last it was answered by *Ms. Rollinson*, who brings out the very same Conclusion.

XV. QUESTION 420 answered by *Κυβερνήτης*.

CONCEIVE the given Series $1 - \frac{x^3}{2.3} + \frac{x^6}{2.3.4.5.6}, \&c.$ to be composed of three others,

$$A \times 1 + p x + \frac{p^2 x^2}{2} + \frac{p^3 x^3}{2.3} + \frac{p^4 x^4}{2.3.4}, \&c.$$

$$B \times 1 + q x + \frac{q^2 x^2}{2} + \frac{q^3 x^3}{2.3} + \frac{q^4 x^4}{2.3.4}, \&c.$$

$$C \times 1 + r x + \frac{r^2 x^2}{2} + \frac{r^3 x^3}{2.3} + \frac{r^4 x^4}{2.3.4}, \&c.$$

Then, by taking A, B, C each $= \frac{1}{3}$, and equating the homologous Terms, we shall have $p + q + r = 0$, $p^2 + q^2 + r^2 = 0$, $p^3 + q^3 + r^3 = -3$, $p^4 + q^4 + r^4 = 0$, $\&c. \&c.$ Make, now, $p^3 = -1$, $q^3 = -1$, and $r^3 = -1$; that is, let p, q and r be the three Roots, $(-1, \frac{1}{2} + \sqrt{-\frac{3}{4}}, \frac{1}{2} - \sqrt{-\frac{3}{4}})$ of the Cubic Equation $x^3 = -1$, or $x^3 + 1 = 0$; then, as both the second and third Terms of this Equation are wanting, not only the Sum of all the Roots ($p + q + r$) but the Sum of all their Squares ($p^2 + q^2 + r^2$) will vanish, or be equal to Nothing, as they ought, to fulfil the Conditions of the two first of the preceding Equations. Moreover, because $p^3 = -1$, $q^3 = -1$, and $r^3 = -1$, it is likewise evident that $p^4 + q^4 + r^4 = -p - q - r = 0$, $p^5 + q^5 + r^5 = -p^2 - q^2 - r^2 = 0$, and $p^6 + q^6 + r^6 = -p^3 - q^3 - r^3 = 3$; which Equations being nothing more than the

the three first, repeated, the Values of p, q, r , above determined, will equally fulfil the Conditions of these also: So that the Series arising from the Addition of the three assumed Ones will agree, in every Term, with that propounded. But $1 + pz + \frac{p^2 x^2}{2} + \frac{p^3 x^3}{2.3}$, &c. the first of those Series, is known to express the Hyperbolic Logarithm of px : Therefore, if N be taken to denote the Number (2.71828, &c.) whose *Hyp. Log.* is *Unity*, then will, $1 + pz + \frac{p^2 x^2}{2}$, &c. $= N^{px}$: And in the same Manner $1 + qx + \frac{q^2 x^2}{2}$, &c. $= N^{qx}$, &c. and consequently $1 - \frac{x^3}{2.3} + \frac{x^6}{2.3.4.5.6}$, &c. $= \frac{1}{3}$ into $N^{\frac{1}{3}x} + N^{\frac{2}{3}x} + N^{x}$

$= \frac{1}{3} N^{-x} + \frac{1}{3} N^{\frac{1}{3}x} \times N^{x/3} \sqrt{-1} + N^{-x/3} \sqrt{-1}$ (making $x = \sqrt{\frac{3}{4}}$). But $N^{x/3} \sqrt{-1} + N^{-x/3} \sqrt{-1}$ is known to express the Double of the Cosine of the Arch $x/3$ (the Radius being 1), which Cosine let be denoted by S , and let the Number whose *Hyp. Log.* is x be represented by T ; then we shall have $1 - \frac{x^3}{2.3} + \frac{x^6}{2.3.4.5.6}$, &c. $= \frac{1}{3T} + \frac{2ST^{\frac{1}{3}}}{3}$. Q. E. I.

From the same Method, and the known Roots of the Equation $x^n + 1 = 0$, the Series $1 + \frac{x^n}{1.2.3(n)} + \frac{x^{2n}}{1.2.3(2n)}$, &c. may be summed, n being any whole positive Number.

PRIZE-QUESTION answered by Mr. O'Callaghan.

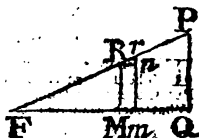
FROM C , the Center of the Circle, let a Semi-Circle AMN be described; and from any two Points D, d in the required Curve ADB , indefinitely near to each other, conceive DC and dC to be drawn, intersecting the Semi-Circle in M and m : Calling $CA, 1$; CB, b ; AM, x ; CD, y ; Mm, \dot{x} ; and dC, \dot{y} . Then $CM(1) : Mm(\dot{x}) :: CD(y) : Dd(\dot{y})$. Whence Dd

$$(\dot{y}) = \sqrt{Dd^2 + d\dot{d}^2} = \sqrt{y^2 \dot{x}^2 + \dot{y}^2}.$$

This, divided by y , gives $\sqrt{\dot{x}^2 + \frac{\dot{y}^2}{y^2}}$;

which (by the Question) is as the Time of

describing Dd , and which, by making $\dot{x} = \frac{\dot{y}}{y}$ (or $x = \text{Hyp. Log. } y$) will be reduced to $\sqrt{\dot{x}^2 + x\dot{x}}$.



Makes

Make now the Right-Line FQ = the Semi-Circumference AMN , and QP (perpendicular thereto) = *Hyp. Log. 5* (= the last Value of x , when $y = 5 = CB$): And let the Line FRP be of such a Nature, that, taking the Abscissa FM equal to the Arch AM , the corresponding Ordinate MR shall be every-where, equal to x : Then R , (the Fluxion of FR) being, *also*, expressed by $\sqrt{xz + x^2}$, it is evident that FR will truly express the Time of describing the Arch AD ; and, consequently, FP the whole Time of describing the Arch ADB ; which will, evidently, be the shortest possible, when FP is a straight Line (as being the shortest that can possibly be drawn between the two given Points F and P).

Hence, putting $FQ (= 3,1416) = p$, and $QP (= \text{Hyp. Log. } 5, CB) = ,6931471 = q$, we have, by similar Triangles, $p : q$

$z : x :: \frac{qz}{p} = \frac{y}{p}$ (p. above); and consequently $Dz = yz = \frac{p}{q}$;

which being to dz (y) in the constant Ratio of p to q , the Angle Dde must be every-where the same, and therefore the Curve ADB , the *Proportional*, or *Logarithmical Spiral*; wherein Dd being to ed in the constant Ratio of $\sqrt{pp + qq}$ to q , we shall therefore have $q : \sqrt{pp + qq} :: NB$ (the whole Increase of the Distance CD) :

$\sqrt{pp + qq} + 1 \times NB = 4,641444$ the true Length of the Spiral Arch ADB . W. W. R.

Corol. It appears from hence that the Time of describing the Spiral ADB will be to the Time of uniformly describing the Arch of the Semi-Circle AMN , with the first Velocity at A , in the given Ratio of FP to FQ , or of $\sqrt{pp + qq}$ to p .

The *Prize-Question* was also truly and concisely answered by *Birchoverensis*, Mr. *Br. Botbam*, Mr. *L. Chalken*, Mr. *J. Goodhead*, Mr. *E. Rollinson*, Mr. *Walter Trott*, Mr. *H. Watson*, and Mr. *R. Weston*, from the *Prob.* in p. 496 of *Simpson's Fluxions*. — The Answer by *Plus-Minus* (though a small Mistake is therein committed) sufficiently discovers the Author to be a Man of Genius.

New MATHEMATICAL QUESTIONS to be answered in the next Year's DIARY.

I. QUESTION 421, by Juvénis.

THREE Men to share a Stock agree, of Fifteen Hundred Pounds The Part of A to that of B, as Four to Three was found; But C's exceeded that of A by Pounds just Ten Times Seven. What each Man share'd, pray, Ladies, say, from what above is given.

II. QUESTION 422, by Mr. William Spry, Engineer.

SUPPOSE that a Cannon Ball is discharged to hit a Target (or other Obstacle) at the Distance of 500 Yards: How far must I stand from the Target, in a Perpendicular

Perpendicular to the Line drawn between it and the Cannon, so as to hear the Report of the Shot and the Explosion of the Piece at the same Instant of Time, allowing the Velocity of the Ball to be to that of Sound in the Proportion of 3 to 2.

III. QUESTION 423, by Birchovenensis.

TO determine the Position of a Point with respect to four given Points, so that Lines being drawn from thence to the given Points, the Sum of the four Squares formed upon them shall be the least possible.

IV. QUESTION 424, by Mr. Tho. Baxtonden, of Liverpool.

AT a Station, due North of a Tower, I observed the Altitude of the Top of the Tower to be 30° , and that of its Base 12° : Proceeding from thence 100 Yards, North-East, down a Path making an Angle of $5^\circ 30'$ with the Plane of the Horizon, I again took the Altitude of the Tower's Summit, which I then found to be $38^\circ 30'$. From whence I desire to know the Height of the Tower, and the Distance thereof from my first Station.

V. QUESTION 425, by Mr. Ja. Beresford.

THE four Sides of a Field, whose Diagonals are equal, are known to be 25, 35, 31, and 19 Perches, in a successive Order; from whence the Content of the Field is required.

VI. QUESTION 426, by Mr. W. Spicer.

A Man laid out 60 Pounds in Sheep, of three different Sorts; for the first Sort he paid 9 Shillings a-piece, for the second 12, and for the third 15: And the Number he bought of each Sort was such, that the Sum of their three Squares was less than it could possibly have been, had he bought more of any one Sort, and less of another. What Number of Sheep did he buy?

VII. QUESTION 427, by Mr. T. Moles.

THE Rectangle under the two Diagonals of any Trapezium drawn into twice the Cosine of the Angle contained by them (the Radius being 1) is equal to the Difference of the Aggregates of the Squares of the opposite Sides of the Trapezium; and the Area of the Trapezium is equal to one Fourth of the same Difference drawn into the Tangent of the said Angle. A Demonstration of this is required.

VIII. QUESTION 428, by Mr. Lionel Charlton.

THE Sum (200) of the two Extremes, and the Sum (300) of the four Means of six Numbers in continued Geometrical Proportion being given; to find the Numbers themselves, by an Equation not exceeding a Quadratic.

"This Question, Mr. Charlton observes, was proposed to him by a Gentleman at the Mathematical College at Edinburgh."

IX. QUESTION 429, by Mr. Walter Trott.

TWO Ships, A and B, sail from a certain Port, in North Latitude, to two other Ports lying under the Equinoctial Line, at the Distance of $666\frac{2}{3}$ Leagues from each other. The Ship A, steering full South (which was her direct Course), made her Port in 15 Days; but B, though she steered the shortest Course possible, and run at the same Rate as A, did not arrive at her Port till the End of 25 Days. Now I demand the Latitude of the Port sailed from, and the true Distance run by each Ship.

X. QUESTION 430, by Mr. Henry Watson.

IN a given Triangle (whose three Sides are 40, 50, and 60) to describe the greatest Ellipse possible; and to determine the Area, and the principal Diameters thereof.

"This Problem, or one like it, was printed in the LADIES' DIARY for 1739, but never was answered in any succeeding Diary, or elsewhere, that I have been able to discover. Your proposing of it, at this Time, will oblige many of your Readers, and particularly your humble Servant, HENRY WATSON."

XI. QUESTION 431, by Mr. W. Bevil.

SUPPOSE a round Post one Foot in Diameter, and fixed perpendicular to the Horizon, on which are wound 100 Rounds of Manchester-Binding (one upon another) whose Thickness is one Twenty-eighth of an Inch. Now, if a Person takes hold of the Extremity of the outward End, and moves round the said Post until he has unwrapped it all, how many Yards will he have travelled when he arrives at the End of his Journey, always keeping as far from the Post as the Binding will admit him?

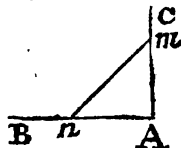
XII. QUESTION 432, by Mr. Edw. Rollinson.

FROM the Equation $mx^3 \dot{x}^2 - nx^2 \dot{x}^2 = p + nx^2 \times q \dot{x}^2$, to determine the general Relation of x and \dot{x} ; and also to find in what Circumstances of the Coefficients m , n , p , q , that Relation can be expressed in finite Terms.

"Dr. BROOK TAYLOR, in his INCREMENTS, after having given a Solution of that Case where $m=4$, $n=4$, $p=1$, and $q=1$, (in which there seems to be a Mistake), says, that if the Coefficients be changed, it does not appear to him that x can be determined, in Terms of \dot{x} , by a finite Equation."

XIII. QUESTION 433, by Mr. R. Weston, Discip. Landenii.

IF a straight, uniform, slender Rod, or Bar, of heavy Metal, of a given Length, be left to descend after being set leaning, in a given Position, with its lower End (m) on the immovable horizontal Plane AB, and its upper End (n) full against the immovable vertical Plane AC (the lower End being at Liberty to slide freely along the first-mentioned Plane, while the upper End is descending), what will be the Position of the Rod when it shall cease to touch the said vertical Plane? how long will it then have been in Motion? and how far from the Point A will the End (m) strike the horizontal Plane?



PRIZE-QUESTION, by Mr. O'Cavanah, of Dublin.

(Whoever answers the same before Candlemas-Day has a Chance for Twelve Diaries.)

A Pert young Exciseman, who boasted his Knowledge

In Gauging of Vessels, and taking an Ullage,

A Wager would lay, his Skill to make good;

And the Case we propos'd for his Tryal thus stood:

"Eighteen Inches, five Tenths, a Cask's Length is given:

"The Heads, which are equal, are each Thirty-seven °.

"It likewise is known, that such is the Make,

"The Cask it is formed the least † Wood to make.

To find the Content quite baffled his Art;

But he hopes you the Method next Year will impart.

° Each Head Diam. is 37 Inches.

† The Superficies is the least possible.

THE Question by Plus-Minus was not omitted on any suspicion of its not being an Original, as the Author (whom we should be glad to oblige) seems to surmise, but because it did not seem sufficiently clear to be understood by the Generality of Readers. The Question by Mr. W. H. for finding the Content of the Cavity formed by two equal Semi-Cylinders, intersecting each other at Right-Angles, is answered in Robertson's Mensuration, and in several other Authors. Such other Questions as have been received, that are Originals, and for our Purpose, will be inserted when Opportunity permits.

If some of our Contributors find the less valuable Parts of their Performances struck but, and their Sentiments, in other Places, contracted into less Compass, it is hoped they will not take Offence, as we are under a Necessity of doing it, in order to make Room for others, that have an equal Right to our Regard.

It having been imagined by some, that the Beginning of Line II, P. 21, of our last Diary, was meant as a Reflection on Mr. W. P---e, Teacher of Mathematics in London; we think it incumbent upon us to declare here, that the said Surmise is entirely without Foundation, and that we are well assured, from our own personal Knowledge, that the Epithet there used, cannot, with any Sort of Propriety, be applied to that Gentleman.

The first Prize, of 10 Diaries, was won by Mr. Sam. Bentley; and the second, of 5 Diaries, by Mr. J. Fletcher. The two new Prizes, of 10 Diaries each (for two of the six best general Solutions of the Enigmas) fell, by Lot, to Sylvius and Mall Ormshaw.

misshw. The 12 Division, for the Solution of the Prime-Question, was won by Mr. Patrick O'Cavanah, of Dublin. Enira's Solution of the Enigmas (though we durst not insert it for fear of giving Offence) was one of the six that stood a Chance for the new Prizes.

✂ All Contributors to this Diary are desired to send their Letters (Post-paid) before the Beginning of May, directed to the Author, at Mr. Richard Hott's, at Stationers-Hall, London.

An Alphabetical Catalogue of the Contributors to this Diary; wherein the Numerical Letters, i, ii, iii, &c. show which Enigmas, and the Figures, 1, 2, 3, &c. which Questions, each answered; A. Q. and P. denote the Solution of the Prime-Enigma, Prime-Question, or the Proposing something new; q. p. and r. signify the Resolution of the Queries, Paradoxes, and Refusals.

MR Rich. Acres *Æ*. Mr W. Allen 3, 4, 5, 7, 8, P. Jack Angier *Æ*. Mr G. Armstrong 1, 7, 8. Mr S. Bamfield all *Æ*. 1, 2, 3, 4, 7, 8, 10, 13. Mr T. Bayley 1, 3, 7, 8. Mr W. Baxter 1, 2, 3. Mr Tho. Baxtonden 1, 3, 7, 8, P. Mr W. Bayley most *Æ*. p. Beliza *Æ*. Mr Sam. Bentley all *Æ*. Mr Ja. Beresford all *Æ*. 1, 2, 3, 4, 7, 8, P. Mr Ja. Bell all q. Birchoverensis 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 13. Q. P. Mr Mich. Bourke *Æ*. Mr Abr. Botham all *Æ*. p. and r. 1, 2, 3, 5, 6, 7, 8, 9, 10. Q. P. Mr W. Bevil 4, 8, 10, 12. Mr J. Boston 1, 3, 6, 7. Miss Bradburn *Æ*. Mr T. Brinkley *Æ*. P. Mr Turner Boston 1, 7. Mr L. Charlton all *Æ*. r. p. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13. Q. P. Mr J. Cheadle *Æ*. Celia all *Æ*. P. Mr Cha. Cave 2, P. Mr J. Clarke *Æ*. P. Mr G. Crabbe 1, 7. Mr Darcy Donought p. Dorinda all *Æ*. but x. Emilia all *Æ*. (in v.) q. r. P. Endymion *Æ*. P. Enira all *Æ*. q. P. W. F. all *Æ*. but vii and viii (in v.) Mr Jos. Farrington all *Æ*. 1, 2, 3, 7. Mr J. Fletcher 1, ii, iii, iv, v, vi, *Æ*. P. Mr T. Fletcher all *Æ*. 1, 3, 7. Mr R. Filicon 1, 3, 4, 7. Mr R. Gibbons all p. r. 7, 8, P. Mr Ja. Giles 1, 3, all the p. P. Mr J. Goodrich all *Æ*. p. 7, 8, Q. P. Mr Edw. Gostwyck *Æ*. Mr Edw. Greensted Eclip. Mr Edw. Griffiths *Æ*. 1, 7, 8. Mr J. Hampson 1, 3, 6, P. Mr T. Harris Sun's Inglets into the 12 Signs. Mr W. Harrison 1, 3, 7, 8, P. Mr T. Harvey P. Mr W. Harvey 1. Mr G. Hicks 1, 3, 7. Mr Sam. Hodgkin most *Æ*. P. Mr F. Holliday q. Mrs Ann Haskin *Æ*. r. Miss Hoyden all *Æ*. P. Mr J. Honey 1, 3, 5, 7, 8. Mr J. Hudson 1, 3, 7. Mr R. Heafest 1, 3. Mr Ralph Huile all *Æ*. r. p. Eclip. P. Tom Jones *Æ*. Mr J. Johnson 8, iii, v, ix, x, 2r. Franch Johnson all *Æ*. P. Mr T. Jackson *Æ*. Mr Jonath. Kimball 1. Mr W. Kingston all *Æ*. r. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, P. Mr T. Knight all *Æ*. but vii, p. r. Mr Geo. Langley all *Æ*. 1, q. P. Mr W. Lee 1. Mr W. Lison most *Æ*. q. p. 1 Q. P. Mr B. Lydal all *Æ*. 1, 7. M. M. *Æ*. Mr F. F. Mangle all *Æ*. p. r. Mr Rob. Marth all *Æ*. but vii, 1 Q. both p. Mevagisensis P. Plus-Minus all *Æ*. P. Mr A. Moore all *Æ*. P. Mr Rich. Morris *Æ*. 1 Q. all q. p. r. P. Miss Betsey Muth all *Æ*. (in a very pretty Letter.) Mr G. Nokes i, ii, iii, iv, viii, ix, xi, xii. 1 q. Mr J. Nunnjan. all *Æ*. P. Mall Ormishaw all *Æ*. Mr T. Osborne *Æ*. 3 p. Mr W. Patrick *Æ*. r. 1 q. Mr E. Paul all *Æ*. but i, v, vii, P. Mr T. Peart 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13. P. Penovius 3, 4, 5, 6, 7, 8, 10, 12, P. Plicator *Æ*. Miss Hen. Redfern all *Æ*. Miss Ann Rickaby *Æ*. Mr W. Rippon 1, q. Mr E. Rollinson all Q. but the 14th. Mr Alex. Rowe *Æ*. 1, 7, 8. Mr T. Sandling *Æ*. 2r. 1 p. 1 q. Scartoneus *Æ*. Dr H. Seafon all *Æ*. 1 and 4 q. p. r. Calc. New and Full Moons, and Moon's Rising and Setting. Miss Lucy Selby all *Æ*. and r. Mr W. Smith most *Æ*. p. r. 1, 2, 3, 4, 7, 8, 10. P. Sophia *Æ*. Mr W. Spicer 1, 2, 3, 4, 5, 7, 8, 10. P. Mr G. Stapley all *Æ*. Mr W. Stoker most *Æ*. 1, 3, 7. Sylvius all *Æ*. q. Mr Ja. Taylor most *Æ*. Miss S. T. 1 q. Mr W. Tallenrach *Æ*. p. Mr Isaac Tarratt *Æ*. Mr W. Terrill 1, 3, 5, 7, 8. Mr R. Terry most *Æ*. p. r. 1, 3, 7. Mrs Grace Tetlow 1, ii, iii, iv, v, vi, 2r. *Æ*. q. p. Mr W. Thompson p. r. 1, 3, 7, 8. Mr Walter Trott 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. Q. Mr Ja. Vicary *Æ*. 1, 2, 3, P. Mr Cha. Underwood all *Æ*. P. T. V. most *Æ*. P. Umbra all *Æ*. P. Mr R. Walton 1. Mr M. Ward most *Æ*. p. 1, 3, 7. Mr H. Wadon all Q. but the 11th and 15th. Mr J. Webster iii, iv, v, vi, ix, x. *Æ*. Miss Ann Williams *Æ*. Mr T. Wilkin *Æ*. r. 1, 3, 7, 8. Mr K. Weston 14, Q. P. Mr F. Weston most *Æ*. Mr J. Winter most *Æ*. Mr J. Woolcott 1, 3, 7, 8. E. X. *Æ*.

The Letters from Mr. W. Spicer, Mr. W. Harrison, Mr. M. Ward, and some others, (being sent after the limited Time) did not come to the Compiler's Hands before the End of May, when the greater Part of this Diary was collected, and ready prepared for the Press.

The GENTLEMAN and LADY's
DIARY and PALLADIUM,

For the Year of our LORD, 1757.

CONTAINING,

NEW IMPROVEMENTS in SCIENCE. A *Perpetual Diary*, for *New and Old Stile*; a *Royal CHRONOLOGER*, or *Memorandum of the Holidays, remarkable Days, &c.* for 1757; and a *radical DIARY*, (1756) serving for *Perpetuity*.—*New Astronomical TABLES* of the *Mean Motions* of the *SUN* and *MOON*, and *Equation Tables*, for readily finding the *Places* and *ECLIPSES* of those *LUMINARIES*.

A *New and Correct ROSTER-GENERAL*, for proportioning the *DUTIES* of an *ARMY*.—Remarks on the late *Bishop of Cloyne's Principles of Human Knowledge, &c.*

The Ninth Number published. *Aut discere aut discere.*—

Humbly inscribed to the *ROYAL SOCIETY*.

By the late *AUTHOR* of the *LADIES DIARY*.

1. WHILE *British* CHIEFS are to their Honour just,
True to their PRINCE, and worthy of their Trust,



4. BRITANNIA'S Brows fresh Laurels shall enfold,
And Britons shall their Happiness behold!—
How vain *Invasions*!—Let our Bounds extend
While *WILLIAM* guides, and *GEORGE* is *Glory's Friend*.

Printed for *S. CROWDER* and *H. WOODGATE*, at the *Golden Ball*, in *Pater-Noster-Row*. MDCCLVII.

2. No foreign Force shall *British Power* dismay,
Nor *Wells* be lost that *Admiral's* betray;

3. While each firm *Patriot* in his Country's Cause,
At *Home* defends her *Liberty* and *Law*;

AUTOREM PALLADII ANGLICANI.

VIR DIGNISSIME!

GRATIAS ago, quod Opuscula mea Loco in Libello tuo accuratissimo dignatus es, et spero Palladium gratius quotannis a nostratibus acceptum iri—vive, et vale.

Sum,

Tui amantissimus,

THOMAS HUNTLEIUS.

T H E
GENTLEMAN and LADY'S
DIARY and PALLADIUM,
For the YEAR 1757.

A PERPETUAL DIARY; shewing, by the *Dominical Letter*, the Day of the *Week* correspondent to the Day of the *Month*, in any Year, *past*, *present*, or to *come*, either according to *NEW*, or *OLD STYLE*.

Months.	Dominical Letters.						
January, Octo.	A	B	C	D	E	F	G
Feb. Mar. Nov.	D	E	F	G	A	B	C
April, July	G	A	B	C	D	E	F
May	B	C	D	E	F	G	A
June	E	F	G	A	B	C	D
August	C	D	E	F	G	A	B
Sept. Dec.	F	G	A	B	C	D	E
	1	2	3	4	5	6	7
Days of the	8	9	10	11	12	13	14
Month corres-	15	16	17	18	19	20	21
pondent to the	22	23	24	25	26	27	28
7 Week-Day	29	30	31				
Columns in or-	Sunday Col. is under						
der of Succes-	the Dom. Let. for the						
sion, from the	Year; which Letter						
Sunday Col.	is to be sought for to						
	the Right of the Mth.						

EXAMPLE I. To find on what Day of the Week the 1st of March happens, 1757, N. S. the Dominical Letter being B, for that Year, N. S.

To the Right of the Month, March, find the Dominical Letter, B, under which, at the Bottom, is the Sunday Column, wherein stand all the Sundays in that Month, viz. 6, 13, 20, 27; so that the 1st of March is on a Tuesday. For the next Columns to the Right, in Order, shew all the Mondays, Tuesdays, Wednesdays, &c. by which the Week-Day to any Month-Day of any Year, is discovered, at Sight, sooner than by any other Method whatsoever.

EXAMPLE

EXAMPLE II. To find on what Day of the Week the 16th of January was on 1701, O. S. the Dominical Letter being E, (See Palladium, 1752, p. 70). — To the Right of the Month, *January*, find the Dominical Letter, E, under which is the *Sunday* Column, wherein stand 5, 12, 19, 26, all the *Sundays* in that Month; consequently *Jan. 16*, stands in the *Thursday* Column, so that *Jan. 16*, 1701, O. S. is on a *Thursday*, required.

EXAMPLE III. To find on what Day of the Month Shrove-Tuesday fell 1709, O. S. the Dominical Letter being B, for Old Style? (See Palladium, 1752, p. 70.) and Golden Number 19? — Shrove-Sunday, by Palladium 1749, p. 36, falls on March 6, consequently Shrove-Tuesday was on March 8, 1709, O. S.

EXAMPLE IV. To find on what Day of the Week the 19th of October falls, 1799, N. S. the Dominical Letter being F, for N. S. (See Palladium, 1752, p. 70.)

To the Right of *October*, find the Dominical Letter, F, under which is the *Sunday* Column, wherein stands 6, 13, 20, 27, all the *Sundays* in that Month; consequently the 19th Day stands in the *Saturday* Column; and therefore Oct. 19, 1799, is on a *Saturday*, required.

N. B. The like is to be observed in general, for all other Cases of Week-Days, and Days of the Month.

EXPLANATION of the CHA-
RACTERS.

CHRONOLOGICAL NOTES for
1757.

● New Moon.	Dominical Letter, N. S.	B
☾ First Quarter.	Old Style	E
○ Full Moon.	Golden Number	10
☾ Last Quarter.	Epa	9
♄ Saturn.	Septuagesima Sunday	Feb. 6
♀ Venus.	Sexagesima	13
♃ Jupiter.	Quingua. or Shrove Sund.	20
♂ Mars.	Ash-Wednesday	23
☉ Sun.	Quadrages. or 1st Sund. in Lent	27
	Palm Sunday	Apr. 3
	EASTER	10
	Low Sunday	17
	Rogation	May 15
	Ascension Day	19
	Whitsunday	29
	Trinity Sunday	June 5
	Advent	Nov. 27

Note, ☾ joined with any other Planet or Planets signifies the Moon is that Day with that Planet, or those Planets, as may be observed, and will afford Pleasure to those having good Glasses.

* * * Correspondents are desired to direct their Letters to the Author of the Diary and Palladium (franked or Post paid) to be left with Mr. John Marchant, on Clerkenwell Green, near Red-lion Street, London. And the Diary Correspondents directing their Letters to the same Place shall be obliged.

*The ROYAL CHRONOLOGER for the YEAR 1757:
Being a MEMORANDUM of the Astronomical Lu-
nations, Holidays, remarkable Days, Lunar Con-
junctions, &c.*

††† The *Festival* marked with * is preceded by a *Vigil* or *Fast*.
If any of the *Feast-Days* marked * fall upon a *Monday*, the
Vigil or *Fast* must be kept on the *Saturday* before, and not on a
Sunday, which is the greatest of *Festivals*.

JANUARY, xxxi Days.	FEBRUARY xxviii Days.
1 <i>Circumcision</i> .	2 <i>Purification Virg. Mary</i> , *
2 2 <i>Sunday after Christmas</i> .	or <i>Candlemas Day</i> .
3 <i>Orion's</i> left Foot souths 6 A. 3.	3 <i>Blaize</i> , 3 <i>Return</i> .
4 <i>Sir Isaac Newton</i> born, 1643, N. S.	4 <i>Sirius</i> souths 5 A. 18.
5 Old <i>Christmas Day</i> .	Full, 7 H. Morning.
6 Full, at Noon.	5 <i>Agatha</i> , 252.
6 <i>Twelfth-Day</i> , or <i>Epiph.</i>	6 <i>Septuagesima Sunday</i> .
8 <i>St. Lucian</i> , Anno 307.	9 Oct. <i>Purif.</i> 4 <i>Return</i> .
9 1 <i>Sund. after Epiphany</i> .	11 Last Qu. 10 <i>Evening</i> .
10 <i>Princess Eliz.</i> b. 1740.	12 <i>Hillary Term</i> ends.
13 <i>Hilary</i> , 367.	13 <i>Sexagesima Sunday</i> . Old Candlemas Day.
14 Last Qu. 11 <i>Morning</i> .	14 <i>Valentine</i> , 45.
14 <i>Oxf. and Camb. Ter. beg.</i> D with U.	15 <i>Canopus</i> souths 4 A. 20.
15 <i>Canopus</i> souths 6 A. 26. Exchequer opens.	16 D ♀.
16 2 <i>Sund. after Epiphany</i> .	17 D ♀.
17 Old <i>Twelfth Day</i> , D with ♀.	18 D ♀.
18 <i>Prisca</i> , 45.	19 New, 1 <i>Morning</i> .
20 <i>Fabian</i> . D ½ ♀. Oct. Hil. 1 ret.	20 <i>Shrove Sunday</i> .
21 New, 2 <i>Morn</i> .	21 <i>Shrove Monday</i> .
22 <i>Vincent</i> .	22 <i>Shrove Tuesday</i> .
23 3 <i>Sund. aft. Epiph.</i> <i>Hilla-</i> <i>ry Term</i> beg.	23 <i>Asb-Wednesday</i> .
24 <i>Sirius</i> souths 6 A. 3.	24 <i>Matthias</i> *. <i>Camb. Come</i> for B. A. the Day after <i>Asb. Wednesday</i> .
25 <i>Conversion of St. Paul</i> .	25 <i>Canopus</i> souths 6 A. 23.
27 <i>Quind. Hill</i> . 2 ret.	D First Qu. 9 <i>Afternoon</i> .
D First Qu. 2 <i>Morn</i> .	26 <i>Regulus</i> souths 7 A. 14.
30 4 <i>S. after Epiph.</i> E. Cba. II. <i>Mart.</i> 1648-9. O. S. 12 M. past One.	27 <i>Quadragesima</i> , 1 <i>Sunday in</i> <i>Lent</i> .
	28 <i>Hare Hunting</i> goes out.
	MARCH xxxi Days.
	1 <i>David</i> , Archb. <i>Menev</i> .
	2 <i>Cedde</i> or <i>Chad</i> . B. <i>Litch</i> . Ember 2, 4, 5 <i>Days</i> .

- 4 Sirius souths 4 A. 31.
 5 *Pr. Mary of Hesse* b. 1722.
 O Full, Midnight.
 6 2 *Sund. in Lent.*
 7 *Perp. Maurit. M.*
 10 D 4.
 12 Gregory, 604.
 13 3 *Sund. in Lent.*
 (Last Qu. 6 Morning.
 14 Sirius souths 2 A. 55
 16 D 7.
 17 St. Patrick. D 8.
 18 Edw. King West Saxons.
 D 8. 9.
 19 *Pr. Lenufa-Ann* b. 1749.
 Joseph.
 20 4 *Sund. in Lent.* Cuthbert.
 Equal Day and Night.
 ● New, 1 Morning.
 21 Benedict, 542.
 24 Sirius souths 2 A. 18.
 Camb. latter Act, Thurs-
 day aft. 4th Sun. in Lent
 25 *Annunciation* Pr. Edw.
 born, 1739.
 First Quarter Day.
 26 Regulus souths 5 A. 31.
 27 5 *Sund. in Lent.*
 D First Qu. 5 Afternoon.

APRIL, xxx Days.

- 1 All Fools Day.
 2 Oxf. and Camb. Terms
 end the Day before Palm
 Sunday.
 3 *Palm Sunday.* Rich. B.
 Chich. 1218.
 4 Ambrose.
 5 Old Lady Day.
 O Full, 3 Morning.
 6 D 4.
 7 Maunday Thursday.
 8 Good Friday.
 10 EASTER Sunday.
 11 Easter Monday.
 (Last Qu. 11 Noon.
 12 Easter Tuesday.
 13 D 7.
 15 Sun and Clocks together.
 16 D 8. Regulus souths
 4 A. 14.

- 17 1 *Sund. aft. Easter, or Lemo*
Sunday. D 9 8.
 19 Alphege, 1006.
 ● New, 1 Morning.
 20 Oxf. and Camb. Ter. beg.
 Wednesday after 1 Sund.
 after Easter.
 23 St. George.
 24 2 *Sund. after Easter.* 1 ret.
 25 St. Mark.
 26 DUKE of CUMBERLAND,
 Captain-General of all
 his Majesty's Forces, b.
 1721.
 D First Qu. Noon.
 27 Victory of Culloden, 1746
 Easter Term begins 17
 Days after Easter.

MAY, xxxi Days.

- 1 3 *Sunday after Easter.* 2
 Return.
Philip and James.
 3 Invention of the Cross.
 D 4.
 O 4 Full, 2 Morn.
 6 St. John Ant. Port. Lat.
 7 Arista souths 6 A. 12.
 8 4 *Sund. aft. Easter.* 3 ret.
 9 Westminster Election, Day
 after 4th Sunday after
 Easter.
 10 D 7.
 (Last Qu. 6 Afternoon.
 12 Old May Day.
 15 Rogation Sunday. 4 ret.
 Rogation Days 16, 17,
 and 18.
 17 D 9. Arista souths 5 A.
 33.
 18 Antares souths 8 A. 32.
 ● New, 2 Morn.
 19 *Ascension-Day.* Holy-Th.
 Dunstan, D 8.
 22 6 *Sund. after Easter.*
 23 Easter Term ends in 17
 Days.
 24 Pr. Fred. Will. b. 1750.
 26 Augustine. Oxf. and Cam.
 Term ends Thursday be-
 fore Whitsunday.

- D First Qu. 5 Afternoon.
 27 Ven. Bede, 673.
 28 Antares souths 7 A. 51.
 29 Whit-Sunday. Nat. & Rest.
 of King Cha. II.
 30 Whit-Monday.
 31 Whit-Tuesday. D 2

JUNE, xxx Days.

- 1 Nicom. Emb. 1, 3, and 4.
 O 2 Full, 10 Morning.
 3 Arcturus souths 5 A. 17
 4 Geo. Pr. of Wales b. 1738
 5 Trinity Sund. Boniface
 6 D 2. Trin. Mond. 1 ret.
 Trinity Col. Election on
 Trinity Monday
 7 Trinity Tuesday
 8 Oxford and Camb. Term
 beg. Wed. after Tr. Sund.
 9 Corpus Christi, Thursday
 after Trinity Sunday
 C Last Qu. 1 Morning
 10 Princess Amelia b. 1711
 Princess Carolina b. 1713
 Trin. Term beg. 5 Days
 after Trinity Sunday
 11 Barnabas, 50
 12 1 Sund. after Trin. D 2
 2 ret.
 14 Arcturus souths 4 A. 32
 16 Sun and Clocks tog. D 2
 ● New, 4 Afternoon
 17 St. Alban. D 2
 19 2 S. aft. Trinity. 3 ret.
 20 Transl. Edw. King W. Sax.
 22 King Geo. II. Inaugur.
 23 Arcturus souths 3 A. 54
 24 Nat. St. John Bapt.* 2d
 Quarter Day
 D First Qu. 8 Night
 25 St. John's Col. Election
 26 3 S. after Tr. 4 ret. King
 Geo. II. proclaimed
 27 D 2
 28 Antares souths 5 A. 43
 29 St. Peter,* Trin. Term
 now ends in 20 Days.
 30 Buck Hunting comes in
 and continues till Holy
 Rood. Ex. Col. Elec.

JULY, xxxi Days.

- O 1 Full, 4 Afternoon
 2 Visitat. Virg. Mary
 3 4 S. aft. Tr. Dies Com.
 4 Transl. St. Martin. D 2
 5 Old Midsummer Day.
 Cambr. Commenc. first
 Tuesday of July.
 7 Thomas à Becket.
 8 Antares souths 5 A. 2.
 C Last Qu. 8 Morning.
 9 Vulture souths 8 A. 21.
 10 5 Sund. aft. Trin.
 11 D 2.
 Oxford Act 7 Days from
 Camb. Commenc. inclu-
 five.
 14 D 2.
 15 St. Swithun.
 16 D 2.
 ● New, 9 Morning.
 17 6 Sund. aft. Trin.
 18 Antares souths 4 A. 22.
 19 Vulture souths 4 A. 41.
 20 Margaret.
 22 Mary Magdalen, 84.
 24 7 Sund. after Trin.
 Magdalen Col. Election.
 D First Qu. 7 Morning.
 25 St. James*, 42.
 28 Antares souths 3 A. 42.
 30 Dog Days begin. Sirius
 rises with the Sun.
 O 30 Full, 11 Night.
 31 8 Sund. after Trin.

AUGUST, xxxi Days.

- 1 Lammas Day.
 6 Transfiguration.
 C Last Qu. 7 Afternoon.
 7 9 Sund. after Trin.
 Name of Jesus.
 9 D 2.
 10 St. Laurence, 259.
 11 Princess Augusta b. 1737.
 14 10 Sund. after Trin.
 ● New, 11 Evening.
 15 Assumption.
 16 D 2.
 19 Vulture souths 5 A. 42.
 21 11 Sund.

- 21 11 *Sund. after Trin.*
Athanasius.
D 22 First Qu. 4 Afternoon.
24 *St. Bartholomew**. 73.
27 D h.
O Full, 7 Morning.
28 12 *Sund. after Trin.*
St. Austin, 432.
29 Beheading St. John Bapt.
30 Sun and Clocks together.

SEPTEMBER, xxx Days.

- 1 Giles, 750.
2 *London burnt*, 1666, O.S.
4 13 *Sund. after Trin.*
C 5 Last Qu. 10 Morning.
7 Eunuchus. D ♂.
8 Nativity of the Blef. Vir-
gin Mary.
9 Dog Days ends. *Canis Ma-*
ior rises at 3 Morn.
11 14 *Sund. after Trin.*
● 13 New, 2 Afternoon.
14 Exaltation of the Cross,
or Holy Cross Day.
15 Ember, 17, 18. D ♀ ♂.
17 Lambert. D ♀.
18 15 *Sund. after Trin.*
D 20 First Qu. Midnight.
21 *St. Matthew**, 90.
22 Equal Day and Night in
all the World.
24 D h.
25 16 *Sund. after Trin.*
26 Cyprian, 288.
O 27 Full, 4 Afternoon.
28 Sheriffs of London sworn.
29 *St. Michael*. 3d Quarter
Day.
Hare Hunting comes in,
and lasts till the End of
February.
30 Jerom, 420.

OCTOBER, xxxi Days.

- 1 Remigius.
2 17 *Sund. after Trin.*
5 D ♂.
C Last Qu. 3 Morning.
6 St. Faith, 290.
9 18 *S. aft. Tr.* St. Denis.

- 10 Oxford and Camb. Term
begins.
Old Michaelmas Day.
13 Translation K. Edw. Conf.
1161.
● New, 4 Morning.
14 D ♂.
15 D ♀.
16 19 *Sund. after Trin.*
17 Etheldred V.
18 *St. Luke*.
D 20 First Qu. 7 Morning.
21 D h.
22 K. Gz. II. crowned, 1727.
23 20 *Sund. after Trin.*
25 Crispin Mart.
O 27 Full, 4 Morning.
28 *St. Simon and Jude**, 64.
30 21 *Sund. after Trin.*

NOVEMBER, xxx Days.

- 1 *All Saints**.
2 All Souls.
3 D ♂. All Souls College
Election.
Cras. Anim. 1 ret.
C Last Qu. 8 Night.
5 *Gun-Powder Treason* 1605.
O. S.
6 22 *Sund. after Trin.*
Leonard, 456.
Michaelmas Term begins
7 Prince Henry-Frederic born,
1745.
9 King Gzo. II. b. 1683,
N. S.
10 King Gzo. II. Birth-day
kept.
Lord Mayor's Day, Lond.
D ♂.
11 St. Martin, 397.
● New, 2 Afternoon.
12 D ♀. Cras. Mart. 2 ret.
13 23 *Sund. after Trin.*
Britius, 421.
14 D ♀.
15 Machutus, 500.
17 Hugh, 1200.
D 18 First Qu. 2 Afternoon.
19 Octab. Mart. 3 ret.
20 24 *Sund.*

- 20 24 *Sund. after Trin.*
Edmund, 871.
22 Cicilia, 225. Old Mar-
tinmas Day.
23 Clement, 92.
24 Baliol College Election,
Thursd. before St. And.
25 Prince William-Henry b.
1743. Catherine.
Quind. Mart. 4 ret.
O Full, 6 Afternoon.
27 *Advent Sunday.*
28 Michaelmas Term ends.
30 *St. Andrew.**
Prin. Dowager of Wales.
b. 1719.

DECEMBER, xxxi Days.

- D 3 Last Qu. 9 Afternoon.
4 1 *Sunday after Advent.*
Barbary.
6 Nicholas, 342.
8 Conception of the Blessed
Virgin Mary.
9 D H.
10 D Q.

- 11 2 *Sund. after Advent.*
New, 7 Morning.
13 Lucy.
14 Ember, 16 and 17
D Q 14th.
15 D H.
16 O Sapientia.
17 Oxford and Camb. Terms
end.
D First Qu. 11 Night.
18 3 *Sund. after Advent.*
Princess Louisa, Queen of
Denmark b. 1724.
21 *St. Thomas*, 35.*
Shortest Day.
23 Sun and Clocks together.
25 *Christmas-Day*, 4th Quar-*
ter Day.
Fox Hunting comes in,
and lasts till Lady-day.
O Full, Noon.
26 *St. Stephen.*
27 *St. John the Evangelist.*
28 *Holy Innocents.*
29 D H.
31 Sylvester, B. of Rome 335

* * * *Whoever answers the following Ænigma before Candlemas-day next has a Chance by Lot for 4, 3, and 2 Palladiums, which will be delivered in London, according to Direction given.*

PRIZE-ÆNIGMA. By Mr. Christopher Mason,

WITH Order and Distinction I began,
And propagated by the Race of Man;
And as the World increas'd, more pop'lar grew,
Grew more exalted—more imperious too.
—Sometimes to *social* Friendship I'm the Band,
A Prince's Envy, and the Pope's Disdain;
And Gallia's Monarch treats me as an Evil,
Who to destroy me thinks no Means uncivil,
The Patriot's Glory I, the Hero's Strife,
The Wiseman's Happiness and Joy of Life.
The Fool's Companion—*faible's Friend's* Despite!
The Rebel Son's, and Profligate's Delight!
The Harlot's Pimp, and Sodomite's Disgrace!
In Norfolk known—or any other Place.
To Number, Weight, and Measure I lay Claim,
Pride, Folly, Merit—most Things you can name:
Though I Extremes in Nature's Scale divide;
Yet I can change and be on either Side.
No false Impostor, form'd of Tricks and Lies,
Is Greater Villain under fair Disguise;
Nor faithful Advocate in Honour's Cause
Is found more honest—with a just Applause.

The CRISIS :
Or BRITANNIA triumphant !

BRITONS, attend ; th'important *Æra's* come,
By Heav'n design'd to fix your future Doom.

FREEDOM, to the surrounding Nations lost,
By Tyrants seiz'd, is your peculiar Boast ;
Long have you *wanton'd* in her lovely Charms,
And strongly held against assaulting Arms :
For Her your great Forefathers stoutly fought,
And with their Lives the noble Treasure bought ;
To you the precious Purchase they assur'd,
Seal'd with their Blood, by righteous Laws secur'd :
For you they conquer'd on the sanguine Plain,
Yours are the *Trophies*—giv'n you to maintain.

Perfidious *France* beheld with envious Eyes,
The calm Serene that blest *Britannia's* Skies,
Saw PEACE and LIBERTY, in Union sweet,
Walk through the *Towns*, and gambol in each *Street* ;
Her COMMERCE through the Universe extend,
Her *Merchants* opulent, and *GEORGE* their Friend ;
While her own Slaves, by Tyranny oppress'd,
In vain bewail their Miseries unredress'd ;
Her *Senates* scarce their Dignity support,
Brow-beat and aw'd by an imperious Court ;
Her *Clergy* swoln with Pride and furious *Zeal*,
O'er *Prince* and *People* domineer at Will :
Yet strong in Armies, and with Pow'r elate,
LEWIS imagines he's supremely great ;
That all must stoop to his superior Sway,
And Nations free his sov'reign Nod obey ;
Wonders a State should offer to contend,
Or dare their *Lands* and *Liberties* defend ;
His Pleasure known—That Nothing they possess
Is longer their's than he declares it his.

Ye happy *Britons*, who to Freedom born,
Disdain the Yoke by Slaves in Fetters worn ;
With gen'rous Scorn the haughty *Frank* despise,
Whose boasted Pow'r in *galconading* lies ;
Exert you Valour ;—to yourselves be true—
And your BRAVE ANCESTORS still have in View ;
By their *Example* fir'd—the humbled Foe
Shall soon his Weakness, and your *Prowess* know.

Is *Glory* now less valued than of old ?
Britannia's Sons less vigorous and bold ?
Can richer Blessings Heav'n itself bestow
Than now through all your *Habitations* flow ?
RELIGION ! LIBERTY in full Extent,
And all those Rights by Heav'n and Nature sent

To bless Mankind, on you indulgent smile,
 And nobly flourish through this *favour'd Isle*.
 Will you contented, or supinely yield,
 The full grown Harvest of so rich a Field?
 The ripen'd Fruits of so much Blood and Sweat,
 Tamely resign—nor struggle, nor regret?
 No, No: so bright a Prize you'll never lose!
 But with your Lives and utmost Pow'r oppose!

Arm then! at once; the KING your Aid demands;
 Your Country begs with supplicating Hands;
 You'll now exert your animated Fire,
 And let *her Cause* each gen'rous Breast inspire!
 Your ROYAL CHIEF, whose martial Deeds are known,
 Whose matchless Courage all the World will own,
 He to true Glory will your Ardour shew,
 And share those Dangers that he leads you to;
Poitier's and *Cressy's* Fields, though high in Fame,
 Eclips'd shall dwindle at his rising Name!
 —Let not some Losses drive you to Despair,
 Count them no more than *Accidents of War*.
 Your num'rous Fleets, well officer'd and mann'd,
 O'er the wide Ocean shall their Sails expand;
 Where'er a Foe they find their Guns shall roar,
 And deaf'ning Peals resound from Shore to Shore!
 Thus rous'd, you will regain your antient Fame,
 And on the *French* retort MINORCA's Shame!
 They, at the Sight of Britain's Navy, quake,
 And their safe Ports, their only Refuge, make;
 Nor dare to face us with an open Brow,
 On their own Dung-hill only beard to crop!
 Your ADMIRALS not the lazy Sons of Peace,
 Nurs'd up at Court, in Luxury and Ease,
 But Men of daring Spirits, and well known,
 Of Courage Proof, and eager for Renown;
 Now such as these our royal Fleets command,
 Firm to their Tacks the British Tars shall stand;
 TRIUMPHS shall still our Victory declare,
 And Britain's Glory brighten by the War!

FACTION, be dumb; and MURMUR silent stand;
 Let Heart and Voice unite throughout this Land;
 In one firm undivided Body join;
 Let all your brave Resolves in one combine—
 To save your Country, and defend your KING—
 Thus you'll triumphant *to Pains sing*!
 EUROPE, by haughty France, no longer aw'd,
 With loud Acclaim your Actions shall applaud;
 Your Children yet unborn your Labours bless,
 And Millions thank you for their Happiness.
 Fair SCIENCE too, the Glory of our Isle,
 Pleas'd with her *Mansions* shall divinely smile:

Applauding

Applauding SENATES *Gratitude* shall own,
OUR SOVEREIGN'S GOODNESS, and OUR CHIEF'S RENOWN!
Upnor Castle, September 17,
1756.

The QUÉRIST, for 1757.

NEW QUERIES.

I. QUERE 63. *By Socius.*

WHAT are the principal Obligations betwixt *Father* and *Son*? And how far are we to attribute the *Blame* of Misfortunes and Disappointments befalling ourselves to our last Parents, or to the *Cause* of our Forefathers in *Lineage* or *Descent* from our original *Stem*; since without that *connected Cause* of our Being, we could neither have existed, nor felt *Pleasure* or *Pain*?

II. QUERE 64. *By Parochialia.*

WHAT is the *principal Cause* of all human *Action*, depending on the *Will* of the *Agent*?

III QUERE 65. *By Mr. Christopher Mason.*

AS our *Passions* are the Sources of most of the *Evil* that happens, or Good acquired, to Mankind, how are they to be governed or stopt in Man as a *free Agent*, to avoid the *Ill* and acquire the Good, according to their intended Ends; since it is by their sudden *Impulse* we are unawares hurried into *Action*, *Difficulty*, *Danger*, or *Destruction*?

*Through Life's vast Ocean diversly we sail,
Reason the Card, but Passion is the Gale.*

IV. QUERE 66. *By Bibliopola.*

WHAT plausible Excuses can be made for Breaches of *Contract*, *Promises*, and solemn Engagements? And likewise for all *Neglects* and *Omissions* whatsoever? How may *Truth* be proved to be *Falsehood*? and *Falsehood Truth*?

V. QUERE 67. *By Publicus.*

WHETHER Admiral B--g's Courage, Knowledge, or Integrity, was the most defective when the Island of *Minorca* was taken?

VI. QUERE 68. *By a Miller.*

WHETHER a *Taylor* or a *Barber* is the more reputable Trade, or Gentleman-like Profession?

VII. QUERE 69. *To a Person who reproached the Author of the Palladium, for his studying Philosophy, and recommended the Bible.*

WHETHER *Common-Sense* is more understood, by the *Vulgar*, than *Philosophy*, or *Mathematics*? How far the *Wisdom* and *Philosophy* of *Socrates*, *Plato*, *Cato*, *Xenophon*, *Seneca*, *Milton*, *Addison*, &c. inculcate, and illustrate the *Doctrines* of the *Bible*? Whether that sacred Book is not full of philosophical Instructions, and especially against the *Profligate* and *Harlot*? And what more than *Astronomy*, the Study of *Princes*, can lift the *Mind* to *God*?

VIII. QUERE 70. *By Mr. Hulse.*

HOW is the continually and prodigious Expence of the *Fire*, *Heat*, and *Light* of the *SUN*, most probably supplied?

IX. QUERE 71. *By Mr. Flitcon.*

WHAT is the Nature of and most probable Use of the *RING* circumscribing the Body of *Saturn*?

X. QUERE 72. *By Mr. Boston.*

HOW is the prodigious explosive Effect of *Gunpowder* accounted for, which *Milton*, in his own Creation, or finely imagined Poem, has thought fit to introduce among the rebellious Powers in *Heaven*?

XI. QUERE 73. *By Mr. Gibbons.*

WHENCE proceed the *Trade-Winds*? And also the *Ebbing* and *Flowing* of the *Tides*?

XII. QUERE 74. *By Mr. Hollingworth.*

WHENCE do every Thing finally proceed?

††† *Whoever sends the best Answers to the following Quere by Candleman has a Chance, by Lot, for 4 and 2 Palladiums (equal to 8 and 4 Diaries) and will be delivered, in London, according to the Direction given.*

PRIZE-QUERE, *By Orthodox.*

SINCE Man in the Rectitude of his mental Capacity is conscious of his being a *Free-agent*, and capable of Good or Ill intended, of *Vice* and *Virtue*, rational or irrational Action, and after a Violence to his Brain, by a *Fever*, or other Accident, is neither conscious or capable of those Properties (especially if he is become an *Idiot* or *Mad*) how does it follow from thence that the *Virtues* and *Vices* of Mankind depend? Whether *Idiots* and *mad Men* are not dismal Instances of the intellectual World being subject to calamitous Accidents, like that of the natural one, (such as *Earthquakes*, *Plagues*, &c.) depending on the Goodness of the Great Being to repair

Repair or restore the Order thereof, when his *general Laws* are interrupted by Casualties? And since the *Will* is only the *Effect* of the *MIND's RESOLUTION*, in a Man's rational State, (and is not a *free* and independent Property as some ill distinguish) how far is Man culpable or inculpable for any Action, to which he is determined, in Consequence of his *Will*? And how far in his *rational State* may his *Mind*, and consequently *Will*, be influenced, or restrained to act, by *internal* or *external* Causes?

N. B. Metaphysics is the highest *Science* the *Mind* is capable of, comprehending all others; and the *equivocal Use* of its Terms, or the Want of due Distinction thereof, has made it so little understood, and so much neglected—Especially as it has been misapplied by *Sceptics* and *Atheists*. But we hope our *Contributors* will be as able to exercise their Faculties about *this extensive Science*, as about the highest *fluxionary, physical, or mathematical Problems*; and see its Utility, in so much enlarging our Ideas and Understanding, in the Knowledge of *Things and Modes, Causes* and their various *Effects* produced on Matter and Mind.

We thank all our Correspondents for their several ingenious Productions, *Miss Green, Fidelity, Felicia, Amelia, Mr. Humley, Mr. Oliver, Mr. Randles, Mr. Town, Mr. Williams, and Mr. Boston*, and a great many others, who shall be obliged as we find Room and Opportunity.—And if any of our *Mathematical* Correspondents find their Productions not inserted or received by a proper Notice of them, we assure them they never came to Hand, and desire they will repeat their Performances directed (franked, or Post Paid) as in the third Page, and we shall be sure to receive them in due Time.

ANSWERS to the *ÆNIGMAS* in the PALLADIUM and DIARY, for 1756.

I. BRITISH FLEET.

II. MUSIC.

III. A DRUM,

IV. AN ARMY.

V. A TARGET,

VI. TRIFLES.

Answers to the *Ænigmas*, by Mr. Christopher Mason.

OUR FLEETS and ARMIES may Great Jove protect,	1. 4.
And British ARMS the Pride of Gaul correct,	5.
While DRUM and Trumpet Victory proclaim,	3.
And martial MUSIC sound Britannia's Fame!	2.
What haughty TRIFLES shall Free Britons dread,	6.
While fell Corruption dares not shew it's Head!	

ANSWERS

ANSWERS to the QUERIES in the PALLADIUM and DIARY, 1756.

I. QUERE 57, answered by Amelia.

A Miser refusing the Enjoyment of what he has, can be made to relieve his Wife. A Rake destroys his Substance, and incapacitates himself, who adds Disease, or perhaps Blows, to a Woman's Necessity and Disgrace; so that of the two Evils, a Miser is a more eligible Husband than a Rake.

II. QUERE 58, answered by Civicus.

AN innocent Man should shun the Law as a Pest! Whose pernicious Effects can be only remedied by Counter-Villany; thereby expelling one Poison by another.

III. QUERE 59, answered by Socius.

UNNATURAL Vices, and natural Evils, finally proceed from corrupt Affections, and immediately acting natural Causes: The intermediate and primary Causes of Things being hard to ascertain, as little understood.

All Discord's Harmony not understood,

All partial Evil universal Good.

Pope.

IV. QUERE 60, answered by Mr. Williams.

LAWYERS assume the Habit of the Clergy to give a Sanction to their Pleadings, as if they were to contain something of Reason, Morality, and Justice.

Ye Lawyers so just,

Be the Cause what it will who so learnedly plead;

How worthy of Trust,

You know black from white,

Yet prefer Wrong to Right,

As you chance to be see'd.

V. QUERE 61, answered by Miss Littlechild.

COURTS of Justice are so called to give a Sanction to their Proceedings, however those Proceedings may happen to be—So the Directors of an Inquisition, (or Spiritual Court) are venerated with the Title of HOLY! in which sanctified Name they receive their Profits from the Prosecution, Persecution, and Misery, inflicted by them on their Fellow Beings, under Pretence of Expiation of Justice, and Reformation of Morals for God's Honour, and the Service of Religion.—In which Proceedings the Humanity, Mercy, and Charity shewn are evident.—But we hope this never will be the Case among Proctors, &c. in our Spiritual Courts at Home.

††† We thank all our other Contributors for their Solutions, which we have not Room to insert; there being other Matter introduced, which

which we think will merit their Regard: but we assure Belinda, Felicia, Fidelia, Miss Hayes, and Miss Green, that we shall oblige them as we find Room and Opportunity.

PRIZE-QUEERE, answered by SOCIUS.

THE Importance of Man is God's Glory, and his own Happiness. And as Man's Obligations for his Creation and Cause of Existence, by which he has a Chance of becoming infinitely happy, are apparent, his Duty is to acquire that Happiness by acquitting himself in Gratitude to his CREATOR, and Benevolence to his Fellow Beings, according to the Obligations with which he is linked and connected in the Dependence and State of his Being.

The Nature and State of Man with Respect to the Universe.

1. We can only judge of Man with Regard to our own System, being ignorant of the Relations of foreign Systems and Things.

2. Man is a Being suited to his Place and Rank in Creation, (like other Creatures) according to the general Order of Things, for Ends and Relations of which he is ignorant.

3. On this Ignorance of future Events, and Hope of future Happiness, his present Happiness depends.

4. His Pride and Vanity in attempting Things above the Reach of his Knowledge, and pretending to a greater Degree of Perfection than he has, are the Cause of his Error and Misery.

5. Man's Impiety, putting himself in the Place of God, and judging of the Fitness or Unfitness, Perfection or Imperfection, Justice or Injustice of his Dispositions.

6. Man's Absurdity, conceiving himself the final Cause of the Creation, or of expecting Perfection in the Moral or Intellectual World not to be found in the Natural.

7. Unreasonableness of Man's Complaint against Providence, while on the one hand he would have the Perfection of Angels, and on the other the bodily Qualifications of Brutes.

8. The Gift of Reason alone compensates for the latter, and to possess any of the sensitive Faculties in a higher Degree would render Man miserable.

9. Throughout the whole visible World an universal Order and Gradation is observed, of Subordination of Creature to Creature, in their Powers and Faculties, and of all Creatures to Man.

10 The Gradations of Sense, Instinct, Thought, Reflection, and Reason, are obvious.

11. How much farther this Subordination of living Creatures may extend above and below is uncertain.

12. Were any Part of which Subordination broken, not only that Part, but the whole connected Creation would be destroyed. And such a Desire would be extravagant Pride, Madness, and Folly in Man.

13. The absolute Submission due to Providence, both as to our present and future State is therefore necessary. The

The Nature and State of Man with Respect to Himself as an Individual.

1. *The Business of Man is not to pry into God, but to study himself; His middle Nature, Powers, Frailties, and Limits of Capacity.*
2. *His two Principles of Self-Love and Reason, are both necessary; Self-Love is the stronger, though the End of that and Reason is the same.*
3. *The Passions have their peculiar Uses. The predominant Matter, Passion, is necessary, by its Force, in directing Men to different Pursuits. Its Use is providential in fixing our Principle, and ascertaining our Virtue.*
4. *Virtue and Vice are joined in our mixed Nature; the Limits near, yet the Things separate and evident.*
5. *Reason has its powerful Office; shewing us Vices, while we deceive ourselves into it.*
6. *The Ends of Providence and General Good are answered in our Passions, and Imperfections, usefully distributed among all Orders of Men, are useful to Society; to Individuals, in every State, through every Age of Life to the End.*

The Nature and State of Man, with Respect to Society.

1. *The whole Universe one System of Society.*
2. *Nothing is made wholly for Itself, nor yet wholly for another.*
3. *The Happiness of Animals are mutual.*
4. *Reason and Instinct operate alike to the Good of each Individual, and to Society, in all Animals. And Society is greatly extended by Instinct, but much farther extended by Reason.*
5. *Reason is instructed from the State of Nature; particularly by Instinct in the Invention of Arts, in the Forms of Society, and in political Societies; monarchial comes from patriarchal Government, and all Governments from the same Principle of Love.*
6. *Superstition and Tyranny are derived from the Principle of Fear.*
7. *Self Love operates to social and public Good.*
8. *Restoration of true Religion and Government are from their first Principle; also mixed Government, various Forms of each; the true End of all being Human Happiness and Protection.*

The Nature and State of Man, with Respect to Happiness.

1. *Happiness has been ill defined by Philosophers; being the End of Man, and attainable by all.*
2. *God governs his Creation by general, not particular, Laws; intends Happiness to be equal, and to be so, it must be social, since all Happiness depends on general Causes.*

3. It is necessary for Order, and the Peace and Welfare of Society, that External Good should be unequal, Happiness is not made to consist therein: For notwithstanding that Inequality the Ballance of Happiness among Mankind is kept even by Providence, by the two Passions of Hope and Fear.

4. The Happiness of Individuals is consistent with the Constitution of the World.

5. The Good Man has here the Advantage; for it is an Error to impute ill to Virtue, happening from the Calamities of Nature, or of Fortune.

6. It is a Folly to expect that God should alter his general Laws in Favour of Particulars.

7. We are not Judges who are Good; but whoever they are, they must be the happiest.

8. External Goods are not the proper Rewards, but are often inconsistent with or destructive of Virtue; even these can make no Man happy without Virtue; as is observed in Riches, Honours, Birth, Greatness, Fame, and Superior Talents; Infelicities happening to Men possessed of them all.

9. Virtue only constitutes Happiness, whose Object is universal, and Prospect eternal; the Perfection of which consists in a Conformity to the Order of Providence here, and a Resignation to it here, and hereafter; or IN THE LOVE OF GOD, AND CHARITY TO ALL MEN, TO THE END. See Mr. Pope's 1. 2. 3. 4. Ethic Epistles, or Essay on Man, addressed to the late Lord Bolingbroke.

N. B. There was no other Solution given to this Prize-Quere; and consequently Socius claimed the Prize Palladiums, which were delivered in London to his Order.

NEW QUESTIONS.

I. QUESTION 115. By Mr. Christopher Mason.

THE Sum of the Squares of the Places of three Letters in the Alphabet, expressing what we most desire to know, being divided by the Sum of their Places, the Quotient will be $10\frac{2}{3}$: What is our Affection so much directed to, and the Name of this GREATEST of SECRETS?

II. QUESTION 116. By Mr. Smith.

THE Name of a worthy Fair, (besides Elinor) at Irthlingborough in Northamptonshire, endowed with the several excellent Qualities of her Sex, Sagacity, Beauty, Wit, Modesty, &c. consists of Six Letters, having their Places in the Alphabet expressed by the successive Values of v, u, w, x, y, and z, in the Six subjoined Equations, by Means whereof her Name may be known, without an affected Equation, and is required?

$$1. \frac{x^2 + w^2 - 2xz}{c} \times \sqrt{x^2 - x^2 + z^2 + x} = 28292323,6 \text{ fere.}$$

$$2. x^2 + z^2$$

$$2. \frac{x^3 + x^3}{x + x} - \frac{x - x}{2} \div \sqrt{\frac{x - x}{2}} = 28,637 \text{ fere.}$$

$$3. \frac{wx - x}{2x} \sqrt[5]{\frac{wx - x}{2x}} \sqrt[5]{\frac{wx - x}{2x}} \sqrt[5]{\frac{wx - x}{2x}} \sqrt[5]{\frac{wx - x}{2x}} \sqrt[5]{\frac{wx - x}{2x}} = 2184.$$

$$4. \frac{v^6 u^4 - x^2 v^2 - x^3 v^2 + y^4 v^2 \times wx^2}{vwxxyz} = 9913 \frac{1043}{1680}.$$

$$5. \frac{v^6 u^5 w^4 x^3 y^2 z}{w u^2 v^3 x^4 y^5 z^6} = 15 \frac{1572791}{5400000}.$$

$$6. x = w.$$

III. QUESTIO 117. *A Dom. Thomas Huntley.*

DATIS in Triangulo, Differentiâ Segmentorum & Differentiâ Basis Angulorum, nec non Analogiâ inter Circuli circumscripti Diametrum & Lineam à Circuli Centro ad Basis Extremitatem, alteræ duârum, quærentur Latera geometricè?

IV. QUESTION 118. *By the same Gentleman.*

ADMIT two *Menisci* Glasses, whose *Convex Surfaces* are each ground to a *Radius* of 10 Inches, and each Glass $\frac{1}{20}$ of an Inch thick, be cemented together, so as to form a double *Convex-Lens* $\frac{1}{4}$ of an Inch thick, and when the *Vacuity* is filled with a transparent *Fluid*, let Rays issuing from a *Candle*, placed in the *Axis* of Radiation 12 Feet distant from the *Vertex* of Incidence, be collected in the *Focus*, 16,76127 Inches distant from the *Vertex* of Emersion; it is required thence to find the *refractive Power* of the said *Fluid*, when compared with that of the *Glass*?

V. QUESTION 119. *By Mr. Bevil.*

REQUIRED the constant *Course* and *Distance* from the *Lizard* to the *Island of Antigua*, in the *West-Indies*, by *Mercator-Sailing*: And the *Angle of Position* at the *Lizard*, and nearest *Distance* from thence to *Antigua*, by *Great Circle-Sailing*: And the greatest *Distance* of those different *Tracks* made over the *Ocean*?

VI. QUESTION 120. *By Mr. Brown.*

The Name of a Town, in *Staffordshire*, famous for having got the *Goose* (as 'tis called) is expressed by eight Letters. The Sum of the Places of each two Letters (counting, in Succession, from the first) is less than the Sum of the Places of each of the other fix Letters, by 69, 51, 33, 17, 25, 37, 55, 77, respectively: Required the Town's Name?

VII. QUESTION 121. *Useful in Navigation. By the Author.*

THE *Altitudes* of two known Stars, (Head of the Serpent, whose R. A. is 17^h. 23^m, and Bright Star in the Eagle R. A. 19^h. 39^m

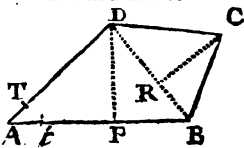
39^m. with Declinations $12^{\circ} 45'$. and $8^{\circ} 13' N.$) being taken at Sea $60^{\circ} 10'$. and $57^{\circ} 4'$. respectively, at the same time of Night, on June 20, 1756, to determine from thence the Latitude of the Place, and Hour of the Night, where and when this Observation was made?

VIII. QUESTION 122. By Mr. Gardiner.

I sailed from the *Limard* on a Course of $49^{\circ} 59' 10''$. South-westerly, till I found by Observation of an Eclipse, my Difference of Longitude 53° . In what Latitude, or Place, was I then arrived, and how far from my first Port?

IX. QUESTION 123. A Dom. Huntleio.

EST Pratum ABCD, quod magna ex Parte Aquis inundatur, quare primo metior $\angle A$ et invenio $= 41^{\circ} 48' 37''$. tum ad Arborem in septo AD consistam 2,5 Catenas emensus, invenio Arborem dictam et $\angle B$ ab $\angle D$ pariter Distantia, deinde per Sepem AB ad Arborem alteram Cat. 3,680348 dimetiens, reperto Arborea bas duas pari quidem intervallo ab $\angle D$ distitas; postremo $\angle B = 118^{\circ} 30'$. et Latus BC $= 9,35$ metiendo invenio ex quibus queritur Prati Capacitas.



X. QUESTION 124. By Parochialis.

A Nobleman agreed with a Banker to purchase of him the greatest Annuity possible to be paid to his Friend for Twenty Years to come, that 1000 *l*. ready Money would buy; what is the required Annuity, and what the Rate per Cent, allowing Compound Interest to the Purchaser for Discount? At the End of which Term what Sum must be paid down to continue the Annuity, allowing 5 per Cent. Compound Interest for 10 Years longer.

XI. QUESTION 125. By Londinensis.

SUPPOSE the Distance of the Old Swan Stairs, near London-Bridge, from the Falcon Stairs in Southwark, to be a Mile, and the Breadth of the Thames $\frac{1}{2}$ of a Mile, and that a Boat sets out in Ebb Tide, from the Falcon, rowing continually towards the Old Swan, at the Rate of four Miles per Hour, and arrives there in 12 Minutes, it is required to find the Velocity of the Tide, and the Equation of the Curve described by the Boat?

XII. QUESTION 126. By Chesterfieldiensis.

IN an oblique-angled Plain Triangle, the three Lines bisecting the three Angles, drawn from thence to the opposite Side being given, 50, 40, and 30, to determine the Sides of that Triangle by the readiest Method?

XIII. QUESTION 127. By the same Gentleman.

LET a be the Hypotenuse of a rectangled Triangle; b , the greater Leg, and c the less; and let $a+c^2 : b^2 :: 11 : 9$; Quere a and c , in rational or complete Numbers, by a general Method?

XIV. QUESTION 128. By Mr. Orchard.

A Purchaser has bought an *Estate*, or perpetual *Annuity*, for 4000 *l.* ready Cash, and is allow'd at the Rate of 4*l.* per Cent. compound Interest *Discount* by the Seller, what is the annual Rent of the Estate he has bought? And what are the Number of Years Purchase in ready Money, this Estate is worth, allowing the Purchaser 5*l.* per Cent. compound Interest, for *Discount*?

XV. QUESTION 129. By Mr. Wigglesworth.

TO determine the Number of *different Sums* of the Roots, and of the Squares, and of the Cubes, of four Places of Letters in the 24 (reckoning from *a, i*, to *z, 24*) and likewise to determine the Name of an *illustrious Person* consisting of six Letters, the Sum of each four Places of which Letters in the Alphabet, from the 1st Letter of the Name, in Succession, being = 58, 59, 67, 59, 45, 52, respectively?

*** Whoever solves the following Question before the First of March next, has a Chance, by Lot, for 12 Palladiums, (equal to 24 Ladies Diaries) which will be delivered in London, according to Direction given.

PRIZE-QUESTION. By Observator Greenovicensis.

TO determine the Moon's Place (nearly) at Noon, Sept. 18, 1758, from her Place, at Noon, by an *Ephemeris* on some preceding Day, and Year, at Noon, by the most short and expeditious Method? Or to determine the Moon's Place at any Time, the most readily and correctly?

ANSWERS to the QUESTIONS in the PALLADIUM and DIARY, for 1756.

I. QUESTION 101, answered by Mr. William Smith, of Irthlingborough.

BY the Nature of the Question, the required Year is between 1700 and 1755. Therefore the *integral Quotient* by 28, must be between $\left(\frac{1700}{28} \text{ and } \frac{1755}{28}\right)$ 60 and 62; consequently 61 is the Quotient: Whence $61 \times 28 + (+6 + 28 - 9) 25 = 1733$, the Year when *Amelia* was born, who was 25 Years of Age in 1755, when the Question was proposed.

The Proposer, Mr. Huntley, curiously solved the same Question in a direct *analytical Method*: as did several others.

II. QUESTION 102, answered by the Proposer, Mr. Huntley.

DIE Maii 15°. cum horarium horam indicabat, invenio Solem ab *Aequatore* 18°. 50'. 7". 54"', et *Augusti* 31°. h. 1. 44^m. 44°. P. M. 8°. 41'. 29". ad Polum arcticum declinare: sit ergo $a = \text{Cos.}$ et $b = \text{Sin.}$ 18°. 50'. 7". 54"', $m = \text{Cos.}$ 8°. 41'. 29". et $n = \text{Sin.}$ ejusdem Arcus; $c = \text{Cos.}$ 45°. = 3 hor. $d = \text{Cos.}$ 26°.

$26^{\circ}. 11' = 1^h. 44^m. 44^s. 1 = \text{Radio}, x = \text{Cof.} \& x = \text{Sin. Latitudinis};$ tum per Theorema à Trigonometricis traditum, $\text{Sinus Altitudinis erit } acx + bx = mdx + nx;$ et reducendo prodit $\frac{x}{m} =$

$\frac{md - ac}{b - n} = 1,2683131 = T. 51^{\circ}. 44'. 55''.$ in quâ Latitudine situs est Hortus; adedque vera Solis Altitudo $41^{\circ}. 54'. 11''.$ apparet; $42^{\circ}. 10'. 53''.$ et Arcus Horizontis, inter Meridianum et Circulum verticalem interceptus Hora nona matutina $64^{\circ}. 3'. 3''.$ quo Tempore projecit Arbor Umbram 22,07134 Pedes longam, unde Horti Latitudo = Pedes 44,14268, et Longitudo 90,71014 Pedes. Q. E. I.

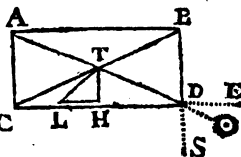
N. B. Tempora in Problemate data non sunt quia Sol Motu suo commensurat, sed quæ motui tenore æquo semper fluenti congruunt.

Solution, by Mr. Smith, of Irthlingborough.

PUT m and n , p and q , for the Sines and Cosines of $18^{\circ}. 50'. 2''$, and $8^{\circ}. 41'. 36''.$ $\frac{1}{2}$, the \odot 's Decl. allowing, for Variation thereof, on May 15, and August 31, r and s for the Cosines of 45° . and $26^{\circ}. 11'$. the angular Distance at each Observation, from Noon; x and y for the Sine and Cosine of the required Latitude. — Then, by Spherics, the Sin. \odot 's Altitude is $mx + rny = px + sqy$, according to Quest. (for the Length of the Shadows from the same Object, are as the \odot 's Altitudes respectively) whence

$\frac{x}{y} = \frac{sq - rn}{m - p} = 1.26884015 = T. 51^{\circ}. 41'. 28''. 40''.$ the required Latitude

NOW, from above, the \odot 's Altitudo = $41^{\circ}. 53'. 51''.$ = $\angle THL$, the Cotang. of which put = e , and $b = TH = 20$ Feet, then, by plain Trigonom. $bt = LH = 22.29233$ Feet = $\frac{1}{2} AC = \frac{1}{2} BD$, per Quest. — Moreover, by Spherics, (because $r = \sqrt{1 - r^2}$)



$\frac{my - nrx}{nr} = \text{Cotang. } \odot\text{'s Azim. from } S^{\circ}.$ at first Observation,

which per Quest. = $\angle SD\odot$, or ADB . — Therefore $\frac{2b \tan r}{my - nrx} = AB = 97.583$ Feet = CD , and 15 Perches, the Garden's Area. W. W. R.

Chesterfeldensis attempted the Solution by another Method.

III. QUESTION 103, answered by the Author of the Palladium.

DETATCHING of Regiments, and answering the Duty-Questions of an Army, is mechanically performed by what is called a ROSTER-GENERAL, of which the following is a correct Plan, for answering the Questions proposed, and all others of the like Nature.

ROSTER.

ROSTER-GENERAL for detaching *Regiments.*

NATIONS.	N.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Dutch.	50	1	2	6	8	9	11	14	15	18	20	22	24	25	28	31	32	33	36	39	40	43	44	46	49	51
British.	17	3			10			16		23				29			34				41			47		
Prussian.	14	4				12		19					26				35		37		42				50	
Hanoverian.	13	5				13		21						30								45				
Danes.	10			7				17					27					38					48			

CONTINUED.

NATIONS.	N.	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Dutch.	50	52	55	57	60	62	63	66	67	70	73	74	75	78	81	82	84	87	88	91	92	95	97	98	100	104
British.	17	53		58			64			71			76			83			89			96			101	
Prussian.	14		56				65			72				79			85				93				102	
Hanoverian.	13	54			61				68				77			86						94			103	
Danes.	10			59					69					80					90					99		

ROSTER-GENERAL for furnishing OFFICERS:

NATIONS	N.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Dutch.	110	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Britiſh.	44	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Hanoverian.	20	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Pruffian.	9	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

CONTINUED.

NATIONS.	N.	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Dutch.	110	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Britiſh.	44	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Hanoverian.	20	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Pruffian.	9	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

THE Defect of all former Rosters has hitherto been the promiscuous placing of the national Columns, and likewise not rightly proportioning the Distances of the Squares of each Nation, correspondent to the Squares of the strongest Nation, by which a Regiment, or more, sometimes, took their Tour of Duty before it came to their Turn. And though it has been alledged that such Tours of Duty, out of Place, where there is a Command, are not to be regarded, while Regiments and Officers, are obliged to obey Orders, yet, if Rosters are to be made, for proportioning the Duties of an Army, they ought to be made true, and not upon wrong Principles.

Explanation

Explanation of a true Roster-General.

THE *figured* or *blank* Squares of a *ROSTER-GENERAL* are only significant: The *Blanks* of the *strongest* Nation, are all significant, being always placed superior, in a *true Roster*, immediately under the *Number'd Squares*. And the *significant Squares* to the respective Columns of each of the subordinate Nations are proportioned, with *due Distance*, and Reference to the Squares of the *strongest* Nation. And the Number of *significant Squares* in every Nation's Column are likewise equal to the Number of *Regiments*, (or *Officers*) of that Nation.

Thus, as 17, 14, 13, and 10 *Regiments*, respectively, of the Nations *less strong*, is to 50 *Regiments* of the *strongest* Nation, so is $\frac{1}{2}$, $1\frac{1}{2}$, $2\frac{1}{2}$, $3\frac{1}{2}$, &c. *Regiments*, to the Number of *Regiments*, or *Squares* in a *Fraction*, proportionable.—And the same for *Officers-Duty*. As 44, 20, or 9 *Captains* of the *subordinate Nations*, in *Strength*, is to 110 *Captains* of the *strongest Nation*, so is $\frac{1}{2}$, $1\frac{1}{2}$, $2\frac{1}{2}$, $3\frac{1}{2}$, &c. *Captains*, to the Number of *Captains*, or *Squares*, in a *Fraction* proportionable.

Now, the next *whole Numbers*, or *Squares*, beyond these *Fractions*, answering to the aforesaid $\frac{1}{2}$, $1\frac{1}{2}$, $2\frac{1}{2}$, $3\frac{1}{2}$, &c. will be the *nearest* Number of *Squares*, answerable to 1, 2, 3, 4 *Regiments*, or *Captains*, of each Nation, in *Succession*; *because any Quantity above a half or that answers to a Quantity next above it, is nearer, or nearer answers to, the whole Number, next above that half, than to any other whole Number whatsoever; as any Quantity less than half is nearer, or answers nearer to, the whole Number next below that half, than to any other whole Number.*

A *few* of the *significant Squares* being found, and *prick'd off*, (by the above Proportions) answering to the superior Squares of the *strongest* Nation, (which are all significant) the *Law of their Continuation* will be visible, when all the *significant Squares* to all the Nations, may be truly and readily *prick'd off*; wherein consists the *Chief Art* of making a *Roster*. The *significant Squares* of all the Nations being *pricked off*, with the *Points* of the *Dividers*, the rest of the *Squares* may be shaded with *crosses*, *right up and down*, *oblique*, or *dotted*, Lines; for *Distinction* of Nations; and the *Blank Squares* may be numbered 1, 2, 3, 4, &c. forward, from the *Beginning*, by proceeding from *Top* to *Bottom*; which Numbers will always represent the *Regiments* (or *Officers*) to be detached from all the Nations. And the *significant Squares* in each Column, as far as those Numbers, will be the *Regiments* (or *Officers*) that each Nation, respectively, ought to furnish, according to the *nearest Proportion*; as appears by the *First Roster*. Or, The *significant Squares* may be left open, as in the *Second Roster*, for counting forward, mechanically, the Number of *Regiments* (or *Officers*) for *Service*, stopping at the Number to be *pricked off*; then count the Number of each Nation *pricked off*, for *Service*. One, two, or more *Dots*, or other arbitrary *Marks*, for *Distinction*, may serve

serve for pricking off the Number of the successive Detachments; which different Dots or Marks, betwixt the Columns, being afterwards counted, will shew the Numbers to be furnished by each Nation, for the several Services required.

NATIONS.	Regiments.				Captains.			Regiments.		
Dutch.	13	10	6	5	14	10	10	12	10	7
British.	4	4	2	2	6	7	5	5	3	2
Prussian.	4	2	2	2	2	4	2	3	3	3
Hanoverian.	3	3	2	1	1	2	1	3	3	1
Dane.	2	2	2	1				3	2	1
An Answer to the Question proposed in Palladium, 1756.	20	21	14	11	23	33	18	26	21	14
The two correct Rosters.								By the Roster in General Bland's Military Discipline, p. 290		

Note, The Rosters according to all former Plans, are erroneous and some in a great Degree. And it may be seen by the Difference of the Proportions from the Roster in General

Bland's Military Discipline, which was the Roster used in Flanders 1708, how one whole Regiment (Officers and Soldiers) of different Nations, came on Duty often before or after its proper Tour or Turn.

ARITHMETICALLY.

RULE.—Divide the Product of the Regiments (or Officers) of each respective Nation, and Number of Regiments (or Officers) to be detached for Service, by the Sum of all the Regiments (or Officers) of the several Nations, and the Quotients will respectively shew the Proportion of Regiments (or Officers) that each Nation ought to furnish.

Take the nearest whole Numbers to these Fractions, so as to make up the Number for Service, (whether above or below the several Fractions found) and you will have the Number of Regiments (or Officers) to be furnished by each Nation—Add the Number of the Regiments (or Officers) of the first Detachment for Service to that of the second, and find the proportional Quantities, in whole Numbers, to be detached by each Nation; out of which several Quantities, deduct the former proportional Quantities, and the Number of Regiments (or Officers) will remain for the second Service. Again, to this Sum of the first and second Detachment, add the Number of the Regiments (or Officers) of the third Detachment, finding the proportional Quantities (by the above Rule) out of which deduct the several Quantities for the Sum of the first and second Detachment, and you will have remaining the Number of Regiments (or Officers) for the Third Service. Again, Add the Sum of the First, Second and Third Detachments to the Fourth, and find the proportional Quantities; out of which deduct the proportional Quantities for the third Service, and the Quantities will remain for the fourth Service, &c. By this Means every Regiment, or Officer, will do their Tours of Duty by Turns, and not before.

D

EXAMPLE

EXAMPLE I.

Nations.	Proport. of Regim ^{ts} .	1st D.	Proport. of Regim ^{ts} .	1st & 2	1st D.	Proport. of Regim ^{ts} .	1 2 3	3 D.	Proport. of Regim ^{ts} .	1. 2. 3. 4.	4 D.	By Chester- fieldensis.
<i>Dutch,</i>	$12 \frac{52}{104}$	13	$22 \frac{62}{104}$	23	10	$29 \frac{34}{104}$	29	6	$34 \frac{64}{104}$	34	5	13 10 7 5
<i>British,</i>	$4 \frac{26}{104}$	4	$7 \frac{71}{104}$	8	4	$9 \frac{101}{104}$	10	2	$11 \frac{80}{104}$	12	2	4 3 2 2
<i>Prussian,</i>	$3 \frac{52}{104}$	4	$6 \frac{34}{104}$	6	2	$8 \frac{22}{104}$	8	2	$9 \frac{72}{104}$	10	2	4 3 2 2
<i>Hanover.</i>	$3 \frac{26}{104}$	3	$5 \frac{91}{104}$	6	3	$7 \frac{65}{104}$	8	2	9	9	1	3 3 2 1
<i>Danish,</i>	$2 \frac{52}{104}$	2	$4 \frac{54}{104}$	4	2	$5 \frac{90}{104}$	6	2	$6 \frac{96}{104}$	7	1	2 2 1 1
	Regim ^{ts} .	26	+21=	47	21	47+14=	61	14	61+11=	72	11	26 21 14 11

EXAMPLE II.

Nations	Propor. of Officers	1 D.	Propor. of Officers	1 & 2	2 D.	Propor. of Officers.	1. 2. & 3 Det.	3 D.	By Cheft- erfieldien- fis.		
<i>Dutch.</i>	$13 \frac{151}{183}$	14	$33 \frac{121}{183}$	34	20	$44 \frac{88}{183}$	44	10	14	20	11
<i>Britifh.</i>	$5 \frac{97}{183}$	6	$13 \frac{85}{153}$	13	7	$17 \frac{145}{183}$	18	5	6	8	4
<i>Hanov.</i>	$2 \frac{94}{183}$	2	$6 \frac{22}{183}$	6	4	$8 \frac{16}{183}$	8	2	2	3	2
<i>Pruffian</i>	$1 \frac{24}{183}$	1	$2 \frac{138}{183}$	3	2	$3 \frac{117}{183}$	4	1	1	2	1
Capts. 23 + 33 = 55 13 56 + 18 = 74 18 23 33 18											

Note, The above *Correct Answers* to Question III. in *Palladium* for 1756, prove the Truth of those by the *Correct Rofers-General*; as the Answers by *Chefterfieldienfis* shew the *General Error* in answering such Questions, or giving such Details of Duty.

WE have formed an Instrument, called the *REGULATOR-GENERAL*, (whose *Surface* is a right-angled Triangle, divided into *Squares*, parallel to the perpendicular Sides) by which all *Quest.* relating to the *Duties* and *Forage* of an *Army*, and also every Thing concerning *Proportion*, may be *mechanically, truly, and speedily* resolved; by the Means of a *Silk-Thread* drawn across the *Squares* from one of the Angles, to which it is fixed, as a Center,

IV. QUESTION 104, answered by the Proposer, Mr.
Oliver Lomax.

$$\begin{aligned}
 & \left\{ \begin{array}{l} p = 25000 \\ q = \text{present Value of } 1\text{ l. to be} \\ \quad \text{received 10 Years hence.} \\ = 0,6756 \\ n = \frac{1}{1,04} \\ \text{LET } s = 10 \text{ Years} \\ x = \text{any indeterminate Part of } s. \\ a = 75 \text{ the Extent of Life ta-} \\ b = 78 \text{ ken 86.} \\ d = \text{Hyperbolic Log. of } n. \\ c = 3 \text{ Years} \\ x = \text{any indeterminate Part of } c. \end{array} \right\}
 \end{aligned}$$

Then, the Fluxion of C, or of his Heir's Expectation will be

$$\frac{p}{a} \times \frac{x n^x}{b} + \frac{p}{b}$$

$$\times \frac{x n^x}{a} + \frac{v}{a} \times$$

$$\frac{b-s}{b} \times \frac{p q}{b-s} \times x n^s.$$

Whose Fluxion corrected is $\frac{p}{a} \times$

$$\frac{x}{bd} \times \frac{1}{d} + \frac{1}{bd^2} + \frac{p}{b} \times \frac{x}{ad} \times \frac{1}{d} + \frac{1}{ad^2} + \frac{v}{a}$$

$$\times \frac{b-1}{b} \times \frac{pq}{b-1} \times \frac{x^{n-1}}{d}, \text{ which, when } x=a, \text{ and } x=c,$$

$$\text{becomes } \frac{p}{a} \times \frac{x}{bd} \times \frac{1}{d} + \frac{1}{bd^2} + \frac{p}{b} \times \frac{x}{ad} \times \frac{1}{d} + \frac{1}{ad^2}$$

$$+ \frac{1}{a} \times \frac{b-v}{b} \times \frac{pq}{b-1} \times \frac{x^{n-1}}{d} = L. 412 \frac{2c6}{1000} \text{ the An-}$$

swer.

Note, In the above Solution not any Regard is had to the Circumstance of A and B dying at any one and the same Instant of Time, because the Probability thereof is infinitely small.

Chesterfieldensis considering the Extent of Life 86 Years, as above, computes the Value of C's Expectation, at 66973 Years Purchase, which multiplied by 1000 = L. 669,73. That according to the London Bills of Mortality, the Year's Purchase, of C's Expectation, will come out 60385, which by 1000 gives L. 603,85 for Answer. This he performs by summing of four Infinite Series, and collecting their respective Quantities.

V. QUESTION 105, answered by the Proposer, Mr. Oliver Lomax.

PUT $x = A$'s Probability of Winning. Then, by Means of the Coefficients of the Binomial $a+b$, raised to the fourth and fifth Power, and a due Application of *Chance-Principles*, I find this Equation, viz. $\frac{256+126x}{512} = x$. Whence $x = \frac{128}{193}$. And

$\frac{193-128}{193} = \frac{65}{193}$ is B's Probability of Winning. Now the Sum of four Moidores and five Guineas is 10*l.* 13*s.* = L. 10.55 Decimals, which multiplied into $\frac{128}{193}$ and $\frac{65}{193}$ will give L. 7.0632 and L. 3.5868 = 7*l.* 1*s.* 3*d.* 168, and 3*l.* 11*s.* 8*d.* 832, the respective Values of A and B's Chances, at their Beginning to play.

Chesterfieldensis computes that $\frac{1}{16}$ will be the Probability that there will not come up four Heads, and $\frac{1}{16}$ the Probability that four Heads will come up. The Odds of which he says are 1 to 15, or $\frac{1}{15}$ to 1, consequently (he says) that A has the better of it by $3\frac{6}{11}$ to 1. W. W. R.

VI. QUESTION

VI. QUESTION 106, answered by Mr. William Smith, of 1rthlingborough.

PUT s for the given Cube, p^2 and q^2 for the two given Squares; then pq and $\frac{p^2}{q}$ will be the required Numbers, whose

Sum $= pq + \frac{p^2}{q} = s^2$. Hence, by assuming $q = 1, 2, 3, \&c.$

and $p = 4, 50, 300, \&c.$ s will be $= 2^{\frac{1}{2}} = 2, 125^{\frac{1}{2}} = 5, 1000^{\frac{1}{2}} = 10, \&c.$ and the required Numbers 4 and 4; 100 and 5; 90 and 100, &c. W. W. R.

Chesterfieldensis answered it by another Method; finding two Numbers $\frac{108}{5}$ and $\frac{27}{5}$.

VII. QUESTION 107, answered by Mr. William Smith.

PUT $a = \frac{1}{2} = 1, 25, b = \frac{5}{2} = 1, 5, 2x =$ Head Diameter of the larger Cask; then $2ax$ and $2bx =$ Bung Diameter and Length ditto; also let $d = 294, 115,$ the circular Divisor for Wine, $c = 167, 50432$ Gallons of *Coniac* Brandy, and $2y =$ Length of the Spheroid. The greatest Cylinder that can be inscribed in the Cask, is also the greatest that can be inscribed in the Spheroid. There-

fore we have by Fluxions $2ax \sqrt{\frac{x}{3}}$ and $2y \sqrt{\frac{x}{3}}$, for the Diameter and Length of the greatest inscribed Cylinder. Whence,

$\frac{16a^2x^2y}{3d\sqrt{x}} = c$. And, by Conics, $y^2 : a^2x^2 :: y^2 - b^2x^2 : x^2$;

Whence $y = \frac{3dc\sqrt{x}}{16a^2x^2} = \frac{abx}{m}$ (putting $m^2 = a^2 - b^2$) and $x =$

$\frac{3mdc\sqrt{x}}{16a^3b} \Big| \frac{1}{2} = 15$ Inches. Hence 32, 40, and 48 Inches are the Head, Middle Diameter and Length of the larger Cask, which holds 229,7864 Gallons of Port Wine; correctly agreeing with the Proposer's Solution.

Chesterfieldensis, by a Correct Process, brings out the same Numbers, viz. 229,78, &c. agreeing with the Proposer's.

VIII. QUESTION 108, answered by Mr. William Smith.

THE Sum of the Lengths of the longest and shortest Day being 24 Hours, there is given the longest Day $= 18$ Hours (by the Question) thence to find the Latitude. The ascensional Difference

$= 88^{\circ}. 52'$. (exclusive of Refraction) whence, by *Spherics*, $T. 23^{\circ}. 29'$. (Sun's greatest Declination) : Rad. :: S. $88^{\circ}. 52'$. $T. 66^{\circ}. 30'. 45''$, the required Latitude. Now, to find when the Day is 16 Hours long in that Place, there is given ascensional Difference $= 58^{\circ}. 52'$. say, $T. 66^{\circ}. 30'. 45''$. : Rad. :: S. $58^{\circ}. 52'$. : $T. 20^{\circ}. 24'. 9''$. the Sun's Declination, which in 1755 nearly answers to 22d of May, and the 22d of July.—But if 18 Hours be taken for apparent Time, the Comp. \odot 's greatest Declination, viz, $66^{\circ}. 31'$ is the Latitude. Likewise, if 16 Hours be taken for apparent Time, the \odot 's Declination is $22^{\circ}. 6'. 8''$. nearly, answering to the 1st of July, and 12th of July. W. W. R.

Chesterfieldensis, by Series, finds the Latitude sought $58^{\circ}. 25'. 56''$; and, by another Series, finds the \odot 's Declination $17^{\circ}. 4'. 39''$, answering (he says) to the 7th of May. Q. E. L. We stay not to examine his Numbers.

IX. QUESTION 109, answered from Mr. Emerson's Navigation,

WHICH considers the constant Course of all Ships crossing the Meridians continually, at the same Angle, and so describing a Spiral in their Way over the Ocean. He is the first (that we know of) who demonstrated the Truth of those Rules of Navigation, that have so long and frequently occurred in Practice; to which his own new and excellent Improvements are added.

By Case I. Plain Sailing, p. 83.

AS Rad : Dist. run in 14 Days = Miles 1848 :: Cos. Course $67^{\circ}. 30'$: 707,19 Miles Dif. Lat. = $11^{\circ}. 47'$; whence (Lat. Lizard being $49^{\circ}. 55'$.) the Lat. is $38^{\circ}. 8'$. after 14 Days run. Again, as Rad. : Dist. run 1848 :: Sin. Course $67^{\circ}. 30'$: Miles 1707,33, the Departure.

By Case IV. Mercator, p. 100.

AS Dif. Lat. 707,19 Miles : Departure 1707,33 Miles :: Merid. Dif. Latitudes 988 from Tables : Dif. Long. 2385,2 Miles = $39^{\circ}. 45'$. Whence (Long. Lizard being $12^{\circ}. 56'$. from the Canaries,) the Longitude after 14 Days Run = $333^{\circ}. 11'$. from the Canaries.

By Case I. Mercator p. 92. and the Scholium.

AS Merid. Diff. Latitudes Miles 1681 : Rad. :: Diff. Long. Miles 783 : Tang. Course $24^{\circ}. 58'. 15''$. S. Westerly, required.

By Case II. Plain Sailing.

AS Cos. Course $24^{\circ}. 58'. 15''$. : Diff. Lat. 1498 :: Rad. : Dist. Miles 1652,47. required.

N. B. Where Longitude is not concerned, the Rules of Navigation exactly correspond with those of Trigonometry for determining the Positions and Distances of Places on a Plain Surface, as Mr. Emerson has demonstrated in his excellent *Epitome of Navigation*—Whose Rules of Navigation corresponding with the *strictest Geometry*, will be true whatever Figure the Earth is of; provided it be generated by any Curve revolving about an Axis: So that

that henceforth all the *Voluminous Works of Navigation* extant considering the Earth's Surface as a *Spheroid*, or giving Rules adapted to any particular kind of Surface, may be justly exploded as waste Paper.

SCHOL. To sail directly at the nearest Distance between any two Places is on the Arch of a great Circle, and requires that the Course be continually altered; except the Places lie under the Equator East and West, or under the same Meridian, North and South of each other.

Mr. Boson's well designed *Process* we omit.

The Whole of Mercator-Sailing, reduced to Practice, in the same Solution by the Author.

OBSERV. 1. The Table of Log. Tangents supply the Table of Meridional Parts, being only a Scale of Log. Tangents of half Complements of Latitudes.

2. The Log. Tangents of Mr. Briggs's Form are a Scale of the Differences of Longitude upon a Rhumb making the constant Angle of $51^{\circ} 38' 9''$. with the Meridian.

3. The Differences of Longitude on different Rhumbs are to one another as the Tangents of the Angles of those Rhumbs with the Meridian.

4. Hence, The Difference of Log. Tangents of $\frac{1}{2}$ Complements of the Latitudes is to the Difference of Longitude a Ship makes in Sailing on any Rhumb, from the one Latitude to the other, as Tang. $51^{\circ} 38' 9''$. (whose Log. is 10.1015104) To Tang. Angle of Rhumb or Course with the Meridian.

CASE I. The Course $76^{\circ} 30'$ S. Westerly, and Dist. 1848 Miles from the Lizard in Lat. $49^{\circ} 55'$. to find the Difference of Latitude and Longitude?

RULE. The Latitude is had from the Consideration that the Dist. is to Diff. Lat. or Hypothensuse to the Base, as Rad. to Cos. Course, which is Plain Sailing.

EXAMPLE.

Log. Dist. 1848 — — — 3.2667020

Log. Cos. Course $76^{\circ} 30'$. 9.5828397

Min. 48°. 55'.

Log. Dif. Lat. — — — 2.8495417 = 707,19 or 11. 47

Lat. sought $38^{\circ} 8'$

CASE II. Two Latitudes, the Lizard $49^{\circ} 55'$, and Lat. $38^{\circ} 8'$, and also the Course being given $76^{\circ} 30'$ S. Westerly, to find the Diff. of Longitude.

RULE. As Tang. $51^{\circ} 38' 9''$ to Tang. Course, so Diff. Log. Tang. of $\frac{1}{2}$ Comp^s. of Lat^s. to Dif. of Long. sought.

Logarithmically. From the Sum of Log. Tang. Course, and Log. of said Dif. of Log. Tang^s. of $\frac{1}{2}$ Comp^s. of Lat^s. subtract the Const. Log. 10.1015104, the Remainder will be the Log. of the Dif. Long. in Minutes.

EXAMPLE.

EXAMPLE.

Comp. Lat.	Half.	Log. Tang.
40° 5'	20° 2½'	9.5620477
51 52	25 56	9.6868981

Dif. 1248,504 Log. 3.0963899
 Log. Tang. Course 67° 30' .. 10.3827757

13.4791656
 — 10.1015104

Log. Long. 2385,92... 3.3776552 or 39° 46'.

CASE III. *Lat. of two Places, one of 38° 8' N. of Barbadoes, 13° 10' N. and Dif. of Long. 13° 31' (between Barbadoes and the Lizard being 52° 49') or 783 Min. and Diff. Lat. 24° 58' or 1498 Min. to determine the Course and Distance?*

Rule. Take, by Tables, the Diff. of the Log. Tang. of ½ Comp^s. of the Lat^s. (considering the 3 last Figures to be Decimals) and subtract the Log. thereof from the Sum of the Log^s. of the Diff. of Long. reduced to Minutes, and of the Const. Log. 10.1015104, the Sum will be the Log. of Tang. of the Course.

For the Distance.

To the Log. of the Secant of the Course add the Log. of the Dif. of Lat. reduced to Minutes, the Sum will be the Log. of the Distance in Minutes.

EXAMPLE.

C. Lat.	Half.	Log. Tang.	Log.
76° 50'	38° 25'	9.8993082	2.8937614 .. 783 Dif. Long.
51 52	25 56	9.6868981	+ 10.1015104 Const. Log.
		12.9952718	
		Dif. 2124,101 Log. 3.3271752 —	

Tang. 24° 58' 15" ... 9.6680966 Course required.

Sec. Course 10.0486213
 Dif. Lat. 1498 ... 3.1755118 +

Minutes 1652,47 3.2181331 Distance required.

Note, Both Complements of Latitude must be taken in the Distances from the same Pole, whether N. or S. And if one be N. and the other S. you must add 90° to one of them, and subtract the other from 90°, taking their Halves, which will be the ½ Distances of the two Places from the same Pole, or the ½ Complements of their Latitudes.

UNIVERSALLY.

If $c = \text{Nat. Tan. of Ship's Course}$, $r = 2,302585$, &c. p and q the *Nat. Cotang^s. of ½ Comp^s. of Lat^s. of two given Places*, and $l = \text{Nat. Tan. of their Dif. Long.}$

Then

XII. QUESTION 112, answered by Mr. Tho. Huntley.

BY *Royal Diary*, D Souths $2^{\text{h}}. 31^{\text{m}}$. P. M. December 1, 1756, London; to which adding four Hours the Difference of Meridians, the Sum $12^{\text{h}}. 31^{\text{m}}$. = the equated Time Southing at *Antigua*. By the same *Diary*, D 's R. A. on December at Noon, is $12^{\circ}. 9'$. on December 2d at Noon, $24^{\circ}. 1'$. the Difference $11^{\circ}. 52'$. Say, m $24^{\text{h}}. 11^{\circ}. 52'$. :: $12^{\text{h}}. 31^{\text{m}}$. : $52^{\text{m}}. 11'$, to which $+ 12^{\circ}. 9'$. = $18^{\circ}. 20'$. D 's R. A. nearly. By the same *Tabla*, \odot 's R. A. December 1. at Noon, $248^{\circ}. 9'. 33''$; on December 2, Noon, $249^{\circ}. 14'. 39''$. Diff. $1^{\circ}. 5'. 6''$. Say, $24^{\text{h}}. 11^{\circ}. 5'. 6''$. :: $12^{\text{h}}. 31^{\text{m}}$. : $33^{\circ}. 58'$, to which $+ 248^{\circ}. 9'. 33''$. = $248^{\circ}. 43'. 31''$. \odot R. A. which taken from D 's R. A. leaves $129^{\circ}. 36'. 29''$. to which $+ 60^{\circ}. = 189^{\circ}. 36'. 29''$. = $12^{\text{h}}. 38^{\text{m}}. 36^{\text{s}}$. Time from 12 at London.

By *Tables* D 's Declination December 1. Noon, London, is $1^{\circ}. 29'$. N. December 2d. Noon, $5^{\circ}. 24'$. Diff. $4^{\circ}. 5'$. — Say, $24^{\text{h}}. 4^{\circ}. 5'$. : $12^{\text{h}}. 38^{\text{m}}. 26^{\text{s}}$. : $2^{\circ}. 38'. 42''$. to which $+ 1^{\circ}. 19'$. = $3^{\circ}. 51'. 42''$. for D 's Declination at Time of Southing. Then say, R. : T. $3^{\circ}. 51'. 42''$. :: T. $17^{\circ}. 10'$. : S. $1^{\circ}. 11'. 40''$. to which $+ 90^{\circ}. =$, in Time, $6^{\text{h}}. 4^{\text{m}}. 16^{\text{s}}$. the D 's Sem. Duration Arc, to which $+ 12^{\text{h}}. 38^{\text{m}}. 26^{\text{s}}$. = $18^{\text{h}}. 43^{\text{m}}. 12^{\text{s}}$. the D 's equated Time of Setting. Then say, as R. : T. $4^{\circ}. 30'. 4''$. :: T. $17^{\circ}. 10'$. : S. $1^{\circ}. 23'. 37''$. to which $+ 90^{\circ}. =$ Sem. Duration Arc corrected = $6^{\text{h}}. 5^{\text{m}}. 37^{\text{s}}$. to which $+ 12^{\text{h}}. 38^{\text{m}}. 26^{\text{s}}$. = $18^{\text{h}}. 44^{\text{m}}. 3^{\text{s}}$. D 's Setting, reckoning from the Noon of December 1, at London; being M. $6^{\text{h}}. 44^{\text{m}}$. 3^{s} . on 2d of December, London, or M. $2^{\text{h}}. 44^{\text{m}}. 3^{\text{s}}$. Time at *Antigua*.

To find the \odot 's apparent Setting? Her Mean Anom. Dec. 1, 28^{h} . P.M. is $2^{\circ}. 6'$. correspondent thereto her Horizontal *Panellon* is $56'. 37''$, and Horizontal Refraction $33'. 45''$, whence, in a Spherical Triangle are given the D 's Zenith Dist. = $89^{\circ}. 37'. 8''$. the Co. Lat. of the Place = $72^{\circ}. 50'$. and the D 's Co. Decl. = $85^{\circ}. 29'. 55''$. to find the \angle at the Pole = $90^{\circ}. 59'. 36''$. = $6^{\text{h}}. 3^{\text{m}}. 58^{\text{s}}$. to which $+ 12^{\text{h}}. 38^{\text{m}}. 26^{\text{s}}$. = $18^{\text{h}}. 42^{\text{m}}. 24^{\text{s}}$. D 's apparent Setting, on December 1, 1756, from Noon, of London, being M. $6^{\text{h}}. 42^{\text{m}}. 24^{\text{s}}$. 2d of December, London, or $2^{\text{h}}. 42^{\text{m}}. 24^{\text{s}}$. Time at *Antigua*, the Diff. of Merid. being 4 Hours.

XIII. QUESTION 113, answered by Mr. W. Smith.

IT is evident the Year required must be *Bissexile*, and the Dominical Letters D and C, therefore put $4x$ = the Year, then

$$\frac{5x-4}{7} = m, \text{ a whole Number; whence } x = \frac{7m+4}{5}. \text{ By } \text{Ta}$$

les in last Year's *Palladium*, 9 must be the Golden Number, .

$$\frac{4x-8}{19} = n, \text{ a whole Number, whence } x = \frac{19n+8}{4}$$

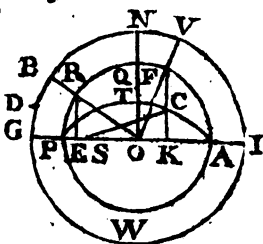
Here $4x-8 = m$, then $17n-28 = 24$. Here 4674

457a73b. Let $4b - c = a$, then $7b - 6a = 24$. Here $2c7b7a$
 Let $2c - d = b$, then $8c - 7d = 24$. Thus, proceeding, I get $24w$
 $- 23x = 24$. Here $w = 1$, and $x = 0$. $\therefore 4x = 1756$, the Year
 required. Q. E. I.

PRIZE-QUESTION, answered by the Rev. Mr. Stephen
 Bolton, of Stalbridge, near Shaftesbury, Dorset.

FOR the Comet of August and September, 1682. One Example
 of the Process. Data—Periodic Time 75.5 Years, SP = 15825;
 PO = 17,8635, according to Dr. Halley.

PREPARATION.—By Sir Isaac
 Newton's Prop. 31. Lib. 1. SO:
 PO::PO:GO. Whence, we
 have the Circumference GNIW =
 216,0225, which call C. Any
 Arc GB—Sine RE (or GV—EK)
 call D; and let Arc GD = 1° .
 P = Periodic Time, and T =
 given Time from Perihelion.



Now, $P:T::C:D$ —If this
 D is greater than GN ($=\frac{1}{2}C$)—
 QO ($=\frac{1}{2}$ Transf.) then the excentric
 Anomaly is greater than 90° , otherwise less.

EXAMPLE.—For 10 Years from Perihelion.

$P:T::C:D=15,36722$, which being greater than 17,142125
 or GN—QO, I conclude the excentric Anomaly from Perih. is
 more than 90° .—First I suppose $GV=100^\circ$, and so VI, FA, or
 Angle FOK = 80° .

1. Trial. $1^\circ : \text{Arc DG} :: 100^\circ : GV = 32,32849$

Rad: FQ ($=PO$) :: S. FOK : FK = 17,59123

Diff. = 24,63726
 True D = 15,36722

— 6,72996

This GV being too little, I suppose it now to be 102° , and so
 VI, FA, or Angle FOK = 78° .

2. Trial. $1^\circ : \text{Arc DG} :: 102^\circ : GV = 32,87457$

R: FO ($=PO$) :: S. FOK : FK = 17,473065

Diff. 15,401505
 True D = 15,36722

+ 0,034285

By comparing the Quantities of Error of + and —, by Double
 Position, the approximated Anomaly will come out $101^\circ. 54'. 37''$.
 which, when examined by the preceding Process, I find to be
 — 0,00196.

Now, by comparing this —, with the last +, I find, by Posi-
 tion, the true excentric Anomaly to be $102^\circ. 54'. 55''$. *quod pro-*
bat.

kind. From hence the other *Requisites* easily follow, viz. The true Anom. from Perih. = $168^{\circ} 4' 44''$, and the Heliocentric Dist. = 21,43240, of \odot m. Dist. à \odot .

For the Comet in November, 1680.

Data—Periodic Time = 575 Years, SP. = 0.006175; PO = 69,14783. From December 1680 to March 1756 = 75,25 Years = T. By the foregoing Method I find the Circumference C. Now, P : T :: C : D = 56,86379.

By the preceding Method of Tryal, I find the excentric Anom. from Perih. 102P. 56l. 50". giving D = 56,86380, which differs from the true D given only by 0,00001. Whence, I infer this to be the exact excentric Anom. from which the true Anom. of this Comet from Perih. will be = $179^{\circ} 23' 25''$. +, and so from Aphel. $0^{\circ} 36' 35''$ and the Heliocentric Dist. = 84,69129 of \odot mean Distance à \odot . The Comet 1680, moving from Perih. or nearest Distance to the \odot , as follows.

Comp.	Years.	Comet's excentric An. à Perih.	Comet's Tr. An. fr. Perih.	Com. dist. a \odot m. D.	D. given.	Dif. fr. D. found.
		o' ' "	o' ' "	o' ' "		
65	10	101 54 55	168 4 4	21,43240	15,36722	,000006—
55	20	134 44 12	173 51 19	30,02580	30,73444	,000129—
45	30	161 2 53	177 32 16	34,20209	46,10166	,000071—
35	40	174 32 34	179 17 48	35,04240	54,553631	,000010—
25	50	149 37 13	175 59 46	32,77007	39,186411	,00010 —
15	60	121 16 43	171 42 54	26,83536	23,819191	,000064+
5	70	80 57 53	161 50 42	15,14907	8,451971	,000041+

each less than 1".

Mr. Bolton rightly observes of the Comet 1680, that the Sem;

Transf. of its Orbit = $69,14783 = \sqrt{575}^2$, instead of 69,1475 printed. That the Perih. Dist. is .006175 \odot m. Dist. à \odot Sem. Transf. 69,14783. He determines the true Anom. from the excentric and heliocentric Dist. thus.

As $\sqrt{\text{Aph. Dist.}}$: $\sqrt{\text{Perih. Dist.}}$:: T. $\frac{1}{2}$ Excent. Anom. : T. $\frac{1}{2}$ true Anom. As S. $\frac{1}{2}$ true An. : S. $\frac{1}{2}$ Excent. An. :: $\sqrt{\text{Perih. Dist.}}$: $\sqrt{\text{Heliocentric Dist.}}$. This Gentleman finds (from Δ 's SKC and KOF) KC, and KF; whence, for Proof, he argues thus. If FK : CK :: QQ : TO, then are the Calculations true, or Anomalies and Heliocentric Distances found Right; who gives Instances of the Agreement of his Numbers, differently computed. Who observes, when the Anomalies from Aphelion are very small, of but few Minutes, the Diff. of a second will create a Diff. only in the third or fourth Decimal in the Heliocentric Dist. In which Case, he says, it is best to say, As Sine true An. from Aph. : Sine Exc. An. from Aph. :: the Sem. Conjugate : Heliocentric Dist.

UNIVERSAL and CORRECT RULES, by the AUTHOR, for determining the true from the mean Anomaly of a Planet, or Comet, in any Orbit whatsoever, and also the Planets or Comets Distance from the SUN.

First

First to find the Excentric from the Mean Anomaly given?

RULE I. As the Apbelion Dist. is to the Perib. Dist. so is the Tangent of $\frac{1}{2}$ the Mean Anomaly from Apbelion to the Tangent of a 4th Arc (nearly equal to $\frac{1}{2}$ the true Anom. from App. by Ward's Hypothesis) which being added to $\frac{1}{2}$ the mean Anomaly given, the Sum will be the correct Excentric Anomaly, from Apbelion, when the Diff. betwixt that and the mean Anomaly given does not exceed 3 Degrees; otherwise, it will be the first approximated Excentric Anomaly, from Apbelion, requiring Correction according to the following Articles: using Supple^{ts}. or $\frac{1}{2}$ Supp^{ts}. when Anom^s. exceed 180°.

Art. 1. As Sem. Transverse is to the Excentricity, so is 57° 17'. 44" $\frac{2}{3}$ = 57° 29' 5777, &c. (whose Logarithm is 1.7481226) the Number of Degrees, or Length of a circular Arc equal to Radius, to a Number of Degrees, which call D.

2. As Radius is to the Number of Degrees D, (a constant Ratio) so is the Sine of the approximated excentric Anomaly, to a Number of Degrees E, which taken from the mean Anomaly will give a second approximated excentric Anomaly.

3. Again, As Radius is to the Degrees D, so is the Sine of second approximated excentric Anomaly to a Number of Degrees F, and so on, which taken from the mean Anomaly will give a third approximated excentric Anomaly.

4. This Analogy must be repeated by putting the Sine of the last approximated excentric Anomaly for a Third Term, till two next Numbers of Degrees (to be subtracted from the mean for the excentric Anomaly) come out, successively, equal to one another; which, by the Use of Logarithms, is quickly performed thus.

RULE II. Add the Log. Sine of the last approximated Excentric Anomaly continually to the constant Log. of the Degrees D (found, as above) for the Log. of the Number of Degrees E, F, G, &c. to be subtracted from the mean for the next approximated excentric Anomaly, with its Correction.

N. B. The foregoing **RULE** (an Improvement from M^{rs}. de La Caille) for its Universality, Ease, and Correctness, exceeds that given in Mr. Simpson's Essays, p. 45, for finding the Excentric Anomaly: Because it gives that Anomaly near the Truth at One Operation (also shewing the fourth Arc nearly half the true Anomaly, according to Ward's Hypothesis)—Mr. Simpson's **RULE**, first, adding the Sine of the mean Anom. to the const. Log. D) instead of the Sine of the approximated Anomaly, first obtained at one Operation) encrease the Number of Operations, to make it approximate; whereas two or three Operations repeated by our Rule, are generally sufficient, except in very excentric Orbits.

To find the True from the excentric Anomaly?

RULE III. As the Square Root of the Apbelion Dist. is to the Square Root of the Perib. Dist. so is the Tangent of half the correct excentric Anomaly to the Tangent of half the true Anomaly.

To determine a Planet's or Comet's Distance from the Sun, from the true and excentric Anomaly given?

RULE IV. As Sine of the true Anomaly is to Sine of the excentric Anomaly, so is the Square Root of the Apbelion Dist. multiplied into the Apbelion

Aphelion Dist. (\equiv Sem. Conjugate) to the Planet's or Comet's Distance from the Sun.—Or, As Sine half true Anomaly : Sine of half the excentric Anomaly :: Square Root of Perihelion Dist : to Square Root of the Distance from the Sun.

To determine a Comet's or Planet's Dist. from the Sun, the true Anomaly, and Excentricity of the Orbit being given?

RULE V. As the Square of Radius is to the Square of the Sine of half the true Anomaly, so is the Distance between the Foci, or double the Excentricity to a fourth Proportional P.

Then, As Sum of the Perihelion Dist. $+P$, is to the Perihelion Dist. so is the Aphelion Dist. to the Comet's or Planet's Distance from the Sun.—Or, As Radius to Cos. true Anomaly, so is the Excentricity to a Quantity Q.

Then, As half Transverse $+Q$ or $-Q$ is to Perih. Dist. so is the Aphel. Dist. to Dist. of a Comet or Planet from the Sun.

N. B. $+$ is used for 3, 4, 5, 6, 7, and 8 Signs of true Anomaly, and $-$ for the other Signs.

EXAMPLE. For the Comet of November 1680.

ITS Period 575 Years Sem. Transf. Orbit $\equiv 69,14783$ (correcting the Press Error) Perih. Dist. $\equiv .006175$ of m. Distances \odot & \odot ; from its Perih. in Dec. 1680 to March 1756 $\equiv 75.25$ Years.

As 575 Years : 360° :: 75.25 Years : $47^\circ. 6'. 47''$. scilicet, M. Anom. from Perih. Whence $132^\circ. 53'. 13''$ \equiv M. An. from Aphel.

OPERATION.

		Loge.
As Aph. Dist. - -	138,289485	7.8592107 co.
To Perih. Dist. - -	.006175	7.7906370
So T. $\frac{1}{2}$ m. An. fr. Aph. $66^\circ. 26'. 36''. \frac{1}{2}$		10.3605275

To T. 4th $\equiv \frac{1}{4}$ true *sem* $+ 21''$. 6.0103758

1. Ap. Exc. An. - 66. 26. 57 $\frac{1}{2} \equiv$ 4th $+ \frac{1}{4}$ M. An.
By Ward's Hyp. $\approx 44^{\text{th}} 40''$. o'. 42nd. Tr. An. fr. Aph.
True An. from below o 36 35

Dist. o 35 53

Showing the Nearness of Mr. Ward's Elegant Rule to Truth in this very excentric Orbit; which may be always applied with Advantage in the Estimation of the true Anomaly of a Planet or Comet by the Method of Trials. As the above Proportion for a first Approximation is very applicable to estimate the first Value of excentric Anom. by Mr. Bohn's Method of Tentation.

		Loge.
As S. Tran. 69,147830		8.1602115 co.
To Excen. 69,141655		1.8397398
So cos. N. $57^\circ. 295777$		1.7581226

To 4th $\equiv 57^\circ. 17'. 26''$ $\equiv 57^\circ. 29067$ 1.7580839 \equiv D
1. Ap. Exc. An. 66. 26. 57 $\frac{1}{2}$ L. Sine - - - 9.9622305 $+ D$

$\equiv 58. 31. 7. \equiv 52^\circ. 5187 + 1.7203144$

M. An'

M. An. fr. Ap. 132. 53. 13

$$2. \text{ Ap. Ex. An. } 80. 22. 6 \text{ L. Sine } = 9.9938345 + D$$

$$F = 36. 28. 59 = 36^{\circ}, 48' 31'' \quad 1.7519184$$

M. Anom. 132. 53. 13

$$3. \text{ Ap. Ex. An. } 76. 24. 14 \text{ L. Sine } = 9.9876559 + D$$

$$G = 55. 41. 6 = 55^{\circ}, 68' 52'' \quad 1.7457398$$

M. Anom. 132. 53. 13

$$4. \text{ Ap. Ex. An. } 77. 12. 7 \text{ L. Sine } = 9.9890744 + D$$

$$H = 55. 52. 3 = 55^{\circ}, 86' 74'' \quad 1.7471583$$

M. Anom. 132. 53. 13

$$5. \text{ Ap. Ex. An. } 77. 1. 20 \text{ L. Sine } = 9.9837579 + D$$

$$I = 55. 49. 36 = 55^{\circ}, 82' 6'' \quad 1.7468418$$

132. 53. 13

$$6. \text{ Ap. Ex. An. } 77. 3. 37 \text{ L. Sine } = 9.9888102 + D$$

$$K = 55. 50. 9 = 55^{\circ}, 83' 58'' \quad 1.7469131$$

132. 53. 13

$$7. \text{ Ap. Ex. An. } 77. 3. 4 \text{ L. Sine } = 9.9888132 + D$$

$$L = 55. 50. 2 = 55^{\circ}, 83' 38'' \quad 1.7468971$$

132. 53. 13

$$8. \text{ Ap. Ex. An. } 77. 3. 11 \text{ L. Sine } = 9.9888161 + D$$

$$M = 55. 50. 3 = 55^{\circ}, 83' 42'' \quad 1.7469000$$

M. Anom. 132. 53. 13

77°. 3'. 10".

Cor. Ex. Anom.

fr. Aphel.

By RULE III. 00. 36'. 35".

True Anom.

102°. 56'. 50".

Cor. Ex. Anom.

fr. Perih.

179°. 23'. 25".

True Anom.

By RULE IV - Comet's Dist. from SUN 84,63074 of ☉
m. Dist. 2 ☉

N. B. Mr. Bolton is found hence to be *correct* in his Solution of the Prize-Question, who therefore claims the 12th Prize Palladium, as due to his Merit.

SEE our NEW ASTRONOMICAL TABLES, or ASTRONOMIA ACCURATA, now in the Press, and soon will be published, for a Variety of Rules and Examples of this Kind. Where the Moon's Place will be found computed true to a Minute, and sometimes less, in any Part of her Orbit; exceeding Mr. Mayer's Astronomical Tables, and all

all others extant, for Facility and Correctness: being constructed on the Newtonian Theory of Gravity, and adjusted by a Series of the most correct and diligent Observations.

ANSWERS to the PARADOXES in last Year's PALLADIUM and DIARY.

I. PARADOX, answered by Mr. A. Brooke, the Proposer.

THE Answer to the Second Paradox, Ladies Diary, 1753; in Ladies Chronologer, 1754, is sufficient.

SUCH a Son may be an *Alien Traytor*, and have no inheritable Blood. In which Case the Lands, according to *Common Law*, go to the *Daughter*, and afterwards to the *Son*.

This is a full Confutation of the *Miller's* and *Moreland's* Answer in the *Diary* 1754, who supposed it necessary that the Man should have as many Women, or Wives, as Children, by their *poétique Answer*.

If the Son be an *Alien*, both born and bred,

He cannot inherit, tho's Father be dead;

Hence no need of two Women—for one may well do,

To assert any farther can never be true:

But this is not all—for here still lies the Jest—

What must they be called—when it comes to the Test—

A Woman and Wife is not always the same,

Since these may be *Wb*—s, then who is to blame?

How then can the *Daughter* e'er put in her Claim,

For a Right of that Settlement, which you both name*.

* *Miller* and *Moreland*.

II. PARADOX, answered by Mr. Charles Brents:
WHEN a CLOCK goes 12 Hours too fast or slow it goes Right.

EMENDATIONS of the PALLADIUM, 1756.

V. DIARY-QUESTION 395. solved.

PUT Cos. $\angle EIA$ (see last Year's Scheme, Page 43.) $= 45^\circ$,
S. $\angle AIS = b = 22^\circ \frac{1}{2}$, S. $\angle BIS = c = 67^\circ \frac{1}{2}$, and $x = S. \angle S$, the
required Course. Now, by Trig. $b : 4 :: x : \frac{4x}{b} = IA$, $c : 10 :: x :$

$\frac{10x}{c} = IB$; and per 6. 1. of Mr. Emerson's Trigonometry,

$$\sqrt{\frac{16x^2}{6} + \frac{100x^2}{c^2} - \frac{80x^2c}{bc}} = AB = 6, \text{ whence } x =$$

$\sqrt[3]{4a^2 + 25b^2 - 20bce} = .7362537 = 8.47^\circ 24' 47'' 45'''$, the required Course from the West.

X. DIARY-QUESTION 400. truly solved. See Page 45.

PUT $p = 1000l.$ $a = 1030l.$ the Sum of all the Payments,

$$r = \text{Interest of } 1l. \text{ for 1 Month. Then } \frac{180 \times 3 + 150 \times 5}{p} + \frac{140 \times 6 + 100 \times 8 + 90 \times 9 + 120 \times 10 + 250 \times 12}{p} =$$

7.94 Months, reckoning 12 Months to the Year. But if 13 Months be allowed it gives 8.19 Months. Here the Amount being taken instead of the Principal, the equated Time will be something less. Therefore, by an easy Process, I find 7.71913 or 7.97913 Months, the Time (according as 12 or 13 Months are allowed to the Year) a might be paid, at the same Rate of Interest. Putting the equated Time $= t$, then $r = \frac{a-p}{pt}$, at Simple Interest. But $r =$

$$\frac{\frac{1}{a}}{\frac{1}{p}} - 1 \text{ at Compound Interest. Whence}$$

			<i>l.</i>	<i>s.</i>	<i>d.</i>				
If 13	Months be reckon'd to the Year the required Rate	}	4	17	9	{ per Cent per Ann.	} at Simple	} Intere-	
12			4	13	3½				} at Comp.
13			4	18	8				
12			4	14	¼				

OVERSIGHTS. Page 4, Line last, read 1755. P. 10, L. 4, from the Bottom, r. lac'd. P. 19, L. 1, r. retrograde. P. 43, L. 9, from Bottom, r. \angle BSL. P. 47, L. 15, within Parenthesis, r. discharging of 20l. 19s. or 21l. P. 70, L. 4, from Bottom, r. 1603. Table I. under Shrove Sunday, L. 4, r. 26. P. 31, L. 26, after 12 Signs interline, the same as Anom. +; L. 28, after Anom. r. + for any Time, &c. L. 31, r. $-a \frac{1}{x}$. L. 32, r. $\frac{1}{x}$. P. 32, L. 2, 3, from Bottom, r. 28 8°, &c. P. 16, L. 32, r. .006175 and .9241 for the Numbers there in \ominus 's mean Distance à \odot , those former Nos. being in Comet's m. Dist. à \odot .

It having been objected to us that 0^0 is not $= 1$ but $= 0$, and that the Logarithm of 1 is not 0, but 1 is said to have no Logarithm by the same Objector, we referred the Matter to an able FLUXIONIST and MATHEMATICIAN, who gave his free Opinion thereof as follows.

The OBJECTION answered.

"THE Objector says you conclude that Nothing $=$ Unity (because $0^0 = 1$) but I never heard you did so; this is all the Ob-

F

"jector's

“jector's own. And that $0 \equiv 1$, since $x \equiv 1$, let x be what it will, he cannot disprove. If he would disprove 0 from being an algebraic Quantity, with more Reason he must throw out negative Quantities; since it is impossible any Thing less than Nothing can really exist. But since no Analyst can work a single Page without Negatives and Nothings, your Point is proved that they are all algebraic Quantities, let their material Quantities be what they will. Pray what can your Objector mean by introducing Salmons upon the Stage, (bidding you remember his Fate for attempting to make Something out of Nothing, as if the known analytical Use of a Cypher, the Nought Power of it or of any algebraic Quantity, producing Unity alike, interfered at all with the Power of Creation) I never heard you wanted to be a God. The known Absurdity this Gentleman lays down in Hand-Writing (that 1 has no Logarithm, or that 0 is not the Logarithm of 1) contradicts all Writers about Logarithms, (even what himself has done) who all agree that 0 is the common Logarithm of 1.”

But, if any Body doubts of 1 having a Logarithm because its common Logarithm is denoted by 0, that Person may be assured, that 1 may have any Number for its Logarithm, provided the Logarithm for 10 be an Unit greater; that for 100 two greater; that for 1000 three greater, &c. the Logarithms increasing and decreasing in arithmetical Progression, by the Diff. 1, correspondent to a geometrical Progression of natural Numbers, in a ten-fold Proportion. For the Indices of Logarithms, however different, alter not their Use and Property; as any Person may perceive by Trial of different Indices to the common Logarithms.

Ex. $10^{\frac{1}{1000}} \quad 10^{\frac{1}{100}} \quad 10^{\frac{1}{10}} \quad 1 \quad 10 \quad 100 \quad 1000$, &c. Nos.

Ex. $x-3 \quad x-2 \quad x-1 \quad x \quad x+1 \quad x+2 \quad x+3$, &c. Log^s.

Let x the Logarithm of 1 be what it will.

ANSWERS to some of the Questions in the Ladies Diary for 1756. (See the Questions in that Diary.)

Questionis Diarii primæ Resolutio à Domino THOM.

HUNTLEY.

PONATUR x pro Anseribus, $x-10$ pro Porcis, et y pro Pretio Porculi unius. Tum $2x + x - 10 \times y = 100$, et $2x - 26 \times y + 2 = 100$, per Data; unde $y = \frac{100 - 2x}{x - 10} = \frac{100}{2x - 26} - 2$, et $100x - 2600 = 40x - 1520$, adeoque $x = 1080 \div 60 = 18$, $y = \frac{100 - 36}{8} = 8$, et $2x - 26 = 10$; quare Numerus Anserum = 18, Porcorum 8, et Pretium 10.

Mr. William Smith, of Irthlingborough, and some others solved the same.

Explicatio

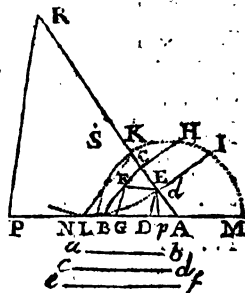
Explicatio Problematis 2di. Ab Eodem.

Investigatio. Pone $a = AC$, $b = AB$, $c = \cos. \angle A$, $d = AD$, $x = AE$, $y = ED = EF$, $FG = DG$, tum ex Theoremate Trigonometrico, $2dx : d^2 + x^2 - y^2 :: r : c$.
 $2cdx = rd^2 + rx^2 - ry^2$,
 fit $r : d : c : p$, atque $2prx = rd^2 + rx^2 - ry^2$ five $2px = d^2 + x^2 - y^2$;
 dein $a : b :: a - x : y$.
 $y^2 = \frac{a^2 - 2ax + x^2 \times b^2}{a^2} = d^2 + x^2 -$

$2px$, et $b^2 - a^2 \times x^2 - \frac{2ab^2 - 2a^2p}{a^2} \times x = d^2 - b^2 \times a^2$.

Analysis precedens Constructio- nem hanc facillime suggerit.

Constructio. Sit ABC Trigonus et D Punctum in Basi datum; fiat AD = AD, et Radio AB describe Semicirculum BHM; à Punctis C, d, erige Normales CH, dI; ducito KL || BC, et dp ⊥ AB; dein assume ab proportionalem ad HC, AC, AC; ed proportionalem ad HC, dI, dI; et ef proportionalem ad HC, pL, ab; fiat AN = cd, NP = ab, & AR = duplo ef; ducatur Linea PR, et inveniatur S Centrum Circuli Triangulum APR includentis, tum Radio SN deferibatur Arcus NBE, et ductis DE, EF || AB, AFG || DE, erit Diagramma DEFG Rhombus Triangulo dato inclusus. Q.E.F.



Mr. William Smith, of Irthlingborough, answers it thus.

LET the given Sides $BC = b$, $AB = a$, $AC = c$, AF or $AG = d$, and x = the Side of the required Rhombus DEKF, or DEHG.

Then by sim. $\triangle sc : a :: x :$

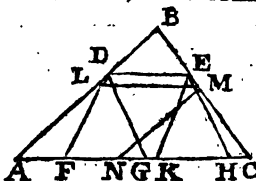
$$\frac{ax}{c} = DB \therefore \frac{ac - ax}{c} = AD. \text{ By}$$

$$\text{Trigonometry, } \frac{a^2 + c^2 - b^2}{2ac} =$$

$$\frac{d^2 + ac - ax}{c} \div 2d \times \frac{ac - ax}{c} = \cos. \angle A. \text{ Whence by}$$

Reduction, Comp. □, and Extraction of a Biquadratic, $x = 9.1989858822$ Inches, the Side of the Rhombus, taking the Data in the Question.

COROLLARY. When one of the \angle s of the \triangle coincides with one \angle of the Rhombus (as $\angle A$ in ALMN, or when $d = 0$) the Sides of the Rhombus (LM, MN) are parallel to those of the \triangle , including the same \angle , when the Rhombus may be determined by sim. \triangle s only.



Questionis Diarii tertii Resolutio. A Dom. Huntley.

ESTO $2x$ = Lineæ diagonali; tum ex Theoremate quod Aream Trianguli, Lateribus exhibet, $x + \frac{1}{2} \times x - \frac{1}{2} \times 9\frac{1}{2} - x \times 9\frac{1}{2} + x$ = Aree Partis minoris quadratæ, et $x + \frac{1}{2} \times x - \frac{1}{2} \times 11\frac{1}{2} - x \times 11\frac{1}{2} + x$ = Aree Partis majoris quadratæ, unde per Data, $x + \frac{1}{2} \times x - \frac{1}{2} \times 9\frac{1}{2} - x \times 9\frac{1}{2} + x \times 25 = x + \frac{1}{2} \times x - \frac{1}{2} \times 11\frac{1}{2} - x \times 11\frac{1}{2} + x \times 9$, et $90\frac{1}{2} - x^2 \times 25 = 132\frac{1}{2} - x^2 \times 9$, adeoque $x^2 = 1066 \div 16 = 66,625$, et $x = 8,162414$; atque Mensura Partis minoris = 39,59935, majoris = 65,99891, et totius Agri = Caten. 105,59826, sive 10 Ju. 8 Qu. 9 Per. Q. E. F.

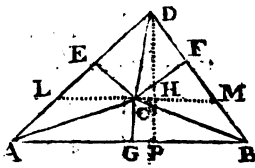
Mr. William Smith of Irthlingborough, by another short and elegant Process of the like Nature, determines the very same Numbers.

IV. DIARY QUESTION 409, answered by Mr. W. Smith, of Irthlingborough.

PUT $a = BD = 16$, $b = AD = 20$, $c = AB = 24$, $x = EC$, $y = CF$, and $z = CG$. By a common

Theorem. $\sqrt{\frac{2a^2b^2 + 2a^2c^2 + 2b^2c^2 - a^4 - b^4 - c^4}{2c}}$

$\frac{2b^2c^2 - a^4 - b^4 - c^4}{2c} = \text{Perpend.}$



$DP = 13.2288 = p$. Per Fig. $bx + ay + cz = pc$, $\therefore x = \frac{pc - bx - ay}{c}$, which multiplied by xy is a Maximum. In Fluxions,

and reduced, by comparing the homologous Terms $y = \frac{pc - bx}{a}$

$\frac{pc - bx}{ax}$, whence $x = \frac{pc}{3b} = 5.29152 = EC$, $y = \frac{pc}{3a} = 6.6144 =$

CF , and $z = \frac{1}{2} p = 4.096 = CG$. Whence

THIS GENERAL RULE. Divide the Base multiplied into the Perp. of the given Δ , by three Times a given Side, and the Quotient will be the Perp. to be let fall on that Side, from the required Point.

SCHOL. Each Δ (ACB, BCD, ACD) is one third of the given Δ ABD. Hence, the rest easily follow, by similar Triangles and Trigonometry

VII. DIARY QUESTION 412, answered by Mr. W. Smith.

FOR x write x , in the given Equations.

Then $1. v + 12x + y = 1734 = a$
 $2. v^2 + 2x^2 + y^2 = 2850972 = b$ } Per Quest.
 $3. vx^2y = 3240960 = c$
 $1-2x \quad 4. v + y = a - 2x$
 $4 \text{ @ } 2 \quad 5. v^2 + 2vy + y^2 = a^2 - 4ax + 4x^2$
 $3 \div \frac{x^2}{2} \quad 6. 2vy = \frac{2c}{xx}$
 $5-6 \quad 7. v^2 + y^2 = a^2 - 4ax + 4x^2 - \frac{2c}{xx}$
 $2-7 \quad 8. 2xx = b - a^2 + 4ax - 4x^2 + \frac{2c}{xx}$
 $8 \times x^2 \text{ and } \div \quad 9. 6x^4 - 4ax^3 + a^2x^2 - bx^2 = 2c$
 $9 \text{ solved} \quad 10. x = 8 = x \text{ the No. of Month, Aug. = Hour PM.}$
 $7-6 \quad 11. v^2 - 2vy + y^2 = a^2 - 4ax + 4x^2 - \frac{4c}{xx}$
 $11 \text{ into } 2 \quad 12. v - y = \sqrt{a^2 - 4ax + 4x^2 - \frac{4c}{xx}}$
 $4 + 12 \quad 13. v = \frac{a - 2x + \sqrt{a^2 - 4ax + 4x^2 - \frac{4c}{xx}}}{2} = 1688$

the Year.

 $13 - 12 \quad 14. y = \frac{a - 2x - \sqrt{a^2 - 4ax + 4x^2 - \frac{4c}{xx}}}{2} = 36$

the Day.

Hence Mr. Christopher Mafen was born August 30, 8 Hours P. M. 1688; being 68 Years of Age in August 1756.

VIII. DIARY QUESTION 413, answered by Mr. Smith.

PUT $r = w + x$, and $s = w + x$; then the two first given Equations become $r^2 - 2p = 89$, and $r + p = 53$; whence, by Reduction, $r = \sqrt{196} = 14$, and $p = 40$. By Substitution $w = 5$, and $x = 8$. Therefore (by supplying the deficient Places with $*$) the Word becomes $*e* *b$. Now, putting $m - mn = x$, $w + ms = y$, the 3d and 4th given Equations, become $m + mn^2 = 18$, and $\frac{m + 3mn^2}{1 + n^2} = \frac{172}{181} = b$; whence, by Re-

duction, $n^2 = \frac{a - m}{m} = \frac{b - m}{3m - b}$, and $m = \frac{3a + \sqrt{9a^2 - 8b} \times x}{4}$

$m = 10$, and $n = \sqrt{\frac{a}{m} - 1} = \frac{2}{3}$; whence, by Substitution,

$1 - n \times m = n = 1$, and $1 + n \times m = y = 19$, making ** cath.*

Now, by putting $m + n = s$, in the last given Equation, and x

as before, it becomes $\frac{1 + 10n^2 + 5n^4}{4 - 4n^2} = \frac{1}{2} = d$; whence $n =$

$\frac{20 + 40d + 4d^2}{5} = \frac{1}{2}$. By Substitution $n = \frac{x}{1 - s}$

$= \frac{1}{2}$, and $1 + n \times m = s = 4$. Whence the Word required is DEATH.

CONSOLATION, by a *Simpsonian*.

AH Friend! how much I grieve for you!

What Wife a *Wb*—, and Daughter too?

Both *vices* bred, and bad enough,—

Lost one her Nose, by taking *Snuff*?

Has one by *Whit*—*d* late miscarried?

What Comforts are in being married!

Such *Brims*—*s* surely ne'er were known,

That nought can cure but DEATH alone!

* See Ladies Diary 1756, p. 45.

NEW FRONTISPIECE VERSES, for the Ladies Diary.

HOW eighteen Geese, eight Hogs, ten Sheep, now grace the Ladies Diary!

How Paddy's Death, and Malon's Birth, with sacred Transports fire ye!

Such Wit and Elegance † must needs resistless charm;

While Slaves and Sluts and Scolds and Sots can every Bosom warm!

† See p. 21. Diary 1756, by Mr. Marmaduke Hogson.

A new and important Problem,

By a *Simpsonian*.

TOM said to John, John how d'ye sell your Geese?

And John said to Tom, Tom Eighteen Pence apiece;

Tom said to John, John that is very dear;

And John said to Tom, how many Toms and Johns were there?

W. W. R.

DIARY QUESTION 415, answered by Newtonienfis.

LET p = Principal, r = 1 l. and its Interest at a Quarter's End, s = Interest alone. Then the Money due at the End of the several Quarters will be as follows.

Quarters

Quarters elapsed.	Money then due.	By Sub- stitution.	By Reftitution.
0 ^p			
1 ^r	$p - 1$	$= A$	$= r^0 p - 1$
2 ^r	$A - 2$	$= B$	$= r^2 p - r - 2$
3 ^r	$B - 3$	$= C$	$= r^3 p - r^2 - 2r - 3$
4 ^r	$C - 4$	$= D$	$= r^4 p - r^3 - 2r^2 - 3r - 4$
5 ^r	$D - 5$	$= E$	$= r^5 p - r^4 - 2r^3 - 3r^2 - 4r - 5$
	$\&c.$	$\&c.$	$\&c.$
x	$G - x$	$= H$	$= r^x p - r^{x-1} - 2r^{x-2} - 3r^{x-3} - \dots - x$
$x+1$	$H - x+1$	$= K$	$= r^{x+1} p - r^x - 2r^{x-1} - 3r^{x-2} - \dots - x+1$

Now, when the Money due is a *Maximum*, the Increase is 0; and therefore the two succeeding Quarters are equal; that is, $rH - x+1 = H$. And $x+1 = H - H$, or $x+1 = H$; where x , or $x+1$ is the Number of Quarters required. Hence we shall have $\frac{x+1}{r} = H = p - r^{x-1} - 2r^{x-2} - 3r^{x-3} - \dots - x$, &c. to $-x$.

So that the Sum of the Series $r^{x-1} + 2r^{x-2} + \dots$, &c. in the Terms of x , will be the Value of x required. The Value of x may be otherwise found by Trials.

The same answered by Mr. Smith, of Irthlingborough.

PUT $p = 2000l.$ $r = 1.05$ $\frac{1}{4}$ the Amount of $1l.$ per Quarter, and $x+1$ for the Number of Payments. Then $pr =$ Amount or Debt just before the 1st Payment, and $p - 1$ the Principal running on $p - 1 \times r =$ Amount or Debt at 2^d Payment, and $pr^2 - r - 2 =$ Principal running on. $pr^2 - r - 2 \times r =$ Amount or Debt at 3^d Payment, and $pr^3 - r^2 - 2r - 3 =$ Principal running on, where the *Law of Continuation* is manifest, and the Series becomes $pr^{x+1} - r^x - 2r^{x-1} - 3r^{x-2} - 4r^{x-3} - 5r^{x-4} - \dots$, &c. to $x+1$ Terms; wherein x is considered the last Term for the Amount or Debt just before $x+1$ Payments. Which Series being constituted of several subordinate Series, I find the Sum of all the geometrical progression Series, and determine $pr^{x+1} - \frac{r^{x+2} + xr + r - x}{r-1} \times r$, the Amount or Debt just before $x+1$

Paym^{ts}. Hence (writing $x-1$ for x) $pr^x - \frac{r^{x+1} + xr - x+1}{r-1} \times r =$ Amount or Debt at x Payments. But it is evident, *per Quæst.* that

Lucy

ESTO

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$$9\frac{1}{2} + x =$$

$$11\frac{1}{2} - x \lambda$$

Data, $x =$

$$x = \frac{1}{2} X$$

$$132\frac{1}{2} - x^2$$

$$8,162414 :$$

$$= 65,998$$

$$s Qu. 9$$

Mr. W

gant Proce
bers.

IV. DIAN

PUT $a.$

20, $c = A$

CF, and z

Theorem.

$$2b^2c^2 - a^2$$

$$2.$$

$$DP = 13.$$

$$pc - bx - a$$

$$s$$

and reduce

$$\frac{pc - bx}{ax},$$

$$ax$$

CF, and

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that the Diff. betwixt the Amount or Debt at $x+1$ and x Terms of Payment = Unity, the Diff. of those Payments. Wherefore,

$$\text{for, } pr^{x+1} - pr^x = 1 \text{, whence, by}$$

$$\text{Reduction, } pr^3 - 3p - 1 \times r^2 + 3p + 1 \times r - p \times r = 1$$

$$\text{solved } x = \frac{\text{Log. } 1-r - \text{Log. } pr^3 - 3p - 1 \times r^2 + 3p + 1 \times r - p \times r}{\text{Log. } r}$$

= 28 Payments; and therefore at the End of 28 Payments, or 7½ Years, the Borrower is most indebted.

REMARK: This best Question in the *Diary* should be answered by considering Simple Interest for the Payments to the first Year's End, or 4 Payments. And 52 Payments at Simple Interest for the Solution to the Rector and Curate Question, *Callidum*, 1756, p. 47. The Debt being *scilicet* 19s. to be paid at 1s. a Week by the Curate to the Rector.

Mr. Smith also sent true Answers to all the *Diary* Riddles, *Rebus*es and *Paradoxes* tho' some of which Answers will hardly be known by the Things proposed; as some of which Things will hardly bear mentioning to Ladies.

Ladies *Diary* QUESTS; 1756, answered by Mr. WILLIAMS—

1. Whether Knowledge or Ignorance is best? — The Answer is evident —

2. Why the Author of the *Diary* wears Horns? Refers to the Cause—

3. Whether *Honestus*, *Honestior*, *Honestissimus* be good Latin? — Yes—Why not?

4. Why should Men first ask Women the Question to marry? —

The Answer.—To spare their Modesty. — As well might have been proposed, *Why should a Wise Man ask no wise Questions? Or why should the Stupid and Brainless attempt Wit and Wit and Wit? Or why should a Rat be a Bird? Ask Mr. Locke*—1. 2. Whether the Thing be another, not included in the same Definition or precise Number of Ideas, a *Fluxion*, a *Magnitude*, &c.

Amicus says the *Diary* Prize, 1756, is taken from *Strophæ Fluxions*, P. 495-6, where the Curve is a *Logarithmic Spirale*, and there is no more to do but find its Length.

TWO VISIBLE ECLIPSES of the MOON, 1757

London.

I. Feb. 4. Beg. 5 45 10
Mid. 7 7 5
End 8 29 0

Apparent Time Moon.

Digits on J's upper Limb,

6° 24'

II. July 30. Beg. 10 9 14
Mid. 11 39 34
End 13 9 54

P. M. Dr. Halley.

Digits on lower Part, D

11° 11'

The 3 Eclipses of the Sun, January 9, February 18, August 14, are all invisible to the Inhabitants of Great Britain.

PRACTICAL EXPRESSIONS, from whence **PRACTICAL RULES** may be readily deduced, for directly determining the Requisites of any Planet's or Comet's Orbit; which Rules we shall exhibit and exemplify hereafter.
 Let a = Semi-Major Axis, e = Eccentricity, c = Dist. from Mean Apom. to Focus, r = Dist. from Apheh to Side, y = Col. Eccentric. Anom. from Apheh.
 Then, by the Property of a Planet's or Comet's Motion in an elliptical Orbit, and the Principles of Trigonometry.

Ex. 1. $\sin \theta \times \text{Col. Arc } \alpha = -b \times \text{Sine An } \alpha$ (Rad. = 1).

2. $y = a \times \text{Sine Arc } \alpha - b \times \text{Col. Arc } \alpha$.

3. $\frac{a \sqrt{1-e^2}}{1+y} = \text{Sine}$; $\frac{1+y}{1-y} = \text{Cot.}$; and $\frac{1+y}{1-y} = \text{Tan. true Anom. from Apheh.}$

4. $\sqrt{\frac{1+y}{1-y}} = \left| \begin{array}{l} \text{Tang. } \frac{1}{2} \text{ true} \\ \text{An. fr. Aph.} \end{array} \right| = \sqrt{\frac{1+e}{1-e}} \times \sqrt{\frac{1+\text{Sine An.}}{1-\text{Sine An.}}}$

5. $\frac{a \times r + b \times \sqrt{1-e^2}}{1+y} = \text{Sine of Equat. of mean to true An.}$

6. $\frac{b \times \sqrt{1-y^2} + a \times \sqrt{1-e^2}}{1+y} = \text{Col. of Equation.}$

7. $\frac{a \times r + b \times \sqrt{1-e^2}}{b \times r + y + a \times \sqrt{1-e^2}} = \text{Tang. of Equation.}$

The reading METHOD of finding the Eccentric from the mean Anom. given, is as follows. By the Author of the Palladium.

Add the Log. 1.758227 (of Days 770, 295779 = Rad.) to the Log. of Eccentricity (Semi. Trans. ans.) for a Conf. Log. of that Orbit—The Sum of which Conf. Log. and Log. Sine of Degrees of Eccentric. Anom. (deducting Rad.) will be the Log. of the Ne. of Degrees Dif. between the Mean and Eccentric Anom. which being added to the Degree of Eccent. Anom. will be equal to the Degree of Mean Anomaly—Therefore, the Eccentric Anom. must be assumed (by Trial and Progress of Error) till it is assumed Right; which is then very quickly performed.

N. B. Chesterfield has solved the *Præter-Question* by Mr. Machin's intricate Method in *Math. Trans.* N°. 347; but not is 'tyme to be a Competitor for the Prize, being justly to show, which Method being not so general, easy and direct Approximation of the Eccentric Anomaly (as the Method, for all Orbits, we have inserted and preferred, giving up our own Pretensions to the Reward, the Prize is allotted to the Reverend Mr. Boscawen for the superior Correction of his Numbers, to those sent us by others.—Mr. Boscawen's direct Method, lately sent us (his Improvement from *Wells* and *Graves*) we do not find so sufficient for Practice as the Method of Approximation inserted.

N. B. For Want of Room we are obliged to defer our wonderful Remarks on the wonderful Principles of Human Knowledge by the late Dr. Berkley, Bishop of Cloyne, 'till our next Palladium.

that the Diff. betwixt the Amount or Debt at $s+1$ and a Term of Payment = Unity, the Diff. of those Payments. Where

fore, $pr^{s+1} - pr^s = \frac{pr^{s+1} - pr^s}{s+1 - s} = \frac{pr^{s+1} - pr^s}{1} = L$, where L is

Reduction, $pr^3 - 3p - 1 \times r^2 + 3p + 1 \times r - p \times r^2 = 0$

solved $x = \frac{\text{Log. } 1 - r - \text{Log. } pr^3 - 3p - 1 \times r^2 + 3p + 1 \times r - p \times r^2}{\text{Log. } r}$

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EXV. 1. $\cos \omega \times \text{Col. Arc } ex, = b \times \text{Sine Anom.}$ (Rad. $a = 1$).

2. $\sin \omega \times \text{Sine Arc } ex, = b \times \text{Col. Arc } ex.$

3. $\frac{a \sqrt{1-e^2}}{1+e} = \text{Sine}; \frac{a(1+e)}{1+e} = \text{Col.};$ and $\frac{a \sqrt{1-e^2}}{1+e} = \text{Tang. true Anom. from Aphel.}$

4. $\sqrt{\frac{1+e}{1+e \cos \omega}} = \left| \text{Tang. } \frac{1}{2} \text{ true An. fr. Aph.} \right| = \sqrt{\frac{1+e}{1+e \cos \omega}} \times \sqrt{\text{T. 4th An.}}$

5. $\frac{a \times (1+e) - b \sqrt{1-e^2}}{1+e} = \text{Sine of Equat. of mean to true An.}$

6. $\frac{b \times \sin \omega + a \sqrt{1-e^2}}{1+e} = \text{Col. of Equation.}$

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TABLE

TABLE

50
TABLE of the Radical *Mean Places and Motions of the SUN*
and *1st Point of Aries*, *Years and Months*, Old Style.

1600	Julian or Old Style											
	M. Pl. Sun.				M. Pl. An. Sun.				M. Pl. 1 st P.			
	1	2	3	4	1	2	3	4	1	2	3	4
Jan. 1	9	20	12	21	3	5	55	39	0	27	35	10
Feb. 1	10	20	45	39	3	5	55	44	0	27	35	14
Mar. 0	11	18	21	32	3	5	55	49	0	27	35	18
Apr. 0	0	18	54	51	3	5	55	54	0	27	35	22
May 0	1	18	29	1	3	5	55	59	0	27	35	27
June 0	2	19	2	19	3	5	56	4	0	27	35	31
July 0	3	18	36	29	3	5	56	9	0	27	35	35
Aug. 0	4	19	9	47	3	5	56	15	0	27	35	39
Sep. 0	5	19	43	5	3	5	56	20	0	27	35	44
Oct. 0	6	19	17	15	3	5	56	25	0	27	35	48
Nov. 0	7	19	50	33	3	5	56	30	0	27	35	52
Dec. 0	8	19	24	43	3	5	56	35	0	27	35	56
1700	Julian or Old Style											
	M. Pl. Sun.				M. Pl. An. Sun.				M. Pl. 1 st P.			
	1	2	3	4	1	2	3	4	1	2	3	4
Jan. 1	9	20	57	53	3	7	38	9	0	28	59	20
Feb. 1	10	21	31	11	3	7	38	14	0	28	59	24
Mar. 0	11	19	7	4	3	7	38	19	0	28	59	28
Apr. 0	0	19	40	23	3	7	38	24	0	28	59	32
May 0	1	19	14	33	3	7	38	29	0	28	59	37
June 0	2	19	47	51	3	7	38	34	0	28	59	41
July 0	3	19	22	1	3	7	38	39	0	28	59	45
Aug. 0	4	19	55	19	3	7	38	45	0	28	59	49
Sep. 0	5	20	28	37	3	7	38	50	0	28	59	54
Oct. 0	6	20	2	47	3	7	38	55	0	28	59	58
Nov. 0	7	20	36	5	3	7	39	0	0	29	0	2
Dec. 0	8	20	10	15	3	7	39	5	0	29	0	6
Years J.	M. Mot. Sun.				M. Mot. An.				M. Mo. 1 st P.			
	1	2	3	4	1	2	3	4	1	2	3	4
	1	2	3	4	1	2	3	4	1	2	3	4
100	0	0	45	32	0	1	42	30	0	1	24	10
200	0	1	31	4	0	3	25	0	0	2	48	20
300	0	2	16	36	0	5	7	30	0	4	12	30
400	0	3	2	8	0	6	50	0	0	5	36	40
500	0	3	47	40	0	8	32	30	0	7	0	50
600	0	4	33	22	0	10	15	0	0	9	25	0
700	0	5	18	44	0	11	57	30	0	9	49	10
800	0	6	4	16	0	13	40	0	0	11	13	20
900	0	6	49	48	0	15	22	30	0	12	37	30
1000	0	7	35	20	0	17	5	0	0	13	1	40
2000	0	15	30	40	0	4	20	10	0	28	3	20
3000	0	22	46	0	0	21	15	0	0	35	5	0
4000	1	0	21	20	2	8	20	0	0	26	6	40
5000	1	7	56	40	2	25	25	50	2	19	8	10
6000	1	15	42	0	3	12	40	0	2	24	10	0

TABLE of the Radical Mean Plan and Motion of the SUN
and 1st π , for Years and Months New Style.

1600		Gregorian or New Style.											
		M. Pl. Sun.				M. Pl. Ap. Sun.				M. Pl. 1 st π .			
Months.		s	o	i	ii	s	o	i	ii	s	o	i	ii
Jan. 1		9	10	20	58	5	5	55	37	0	27	35	9
Feb. 1		10	10	54	16	5	5	55	42	0	27	35	13
Mar. 6		11	8	30	9	5	5	55	47	0	27	35	17
Apr. 6		0	9	3	28	5	5	55	52	0	27	35	21
May 6		1	8	37	37	5	5	55	57	0	27	35	26
June 6		2	9	10	56	5	5	56	2	0	27	35	30
July 6		3	8	45	6	5	5	56	7	0	27	35	34
Aug. 6		4	9	18	24	5	5	56	12	0	27	35	38
Sep. 6		5	9	51	42	3	5	56	18	0	27	35	43
Oct. 6		6	9	25	52	3	5	56	23	0	27	35	47
Nov. 6		7	9	59	10	3	5	56	28	0	27	35	51
Dec. 6		8	9	31	10	3	5	56	33	0	27	35	55
1700		Gregorian or New Style.											
Jan. 6		9	10	7	22	3	7	38	7	0	28	59	19
Feb. 6		10	10	40	40	3	7	38	12	0	28	59	23
Mar. 6		11	8	16	33	3	7	38	17	0	28	59	27
Apr. 6		0	8	49	52	3	7	38	22	0	28	59	31
May 6		1	8	24	2	3	7	38	27	0	28	59	36
June 6		2	8	57	20	3	7	38	32	0	28	59	40
July 6		3	8	31	30	3	7	38	37	0	28	59	44
Aug. 6		4	9	4	48	3	7	38	42	0	28	59	48
Sep. 6		5	9	38	6	3	7	38	48	0	28	59	53
Oct. 6		6	9	32	16	3	7	38	53	0	28	59	57
Nov. 6		7	9	45	34	3	7	38	58	0	29	0	1
Dec. 6		8	9	89	44	3	7	39	3	0	29	0	5
Year G. from 1600		M. Mot. Sun.				M. Mot. Ap.				M. Mo. 1 st π .			
100		11	29	46	24	0	1	42	30	0	1	24	10
200		11	29	32	47	0	3	25	0	0	2	48	20
300		11	29	19	11	0	5	7	30	0	4	12	30
400		0	0	4	43	0	6	50	0	0	5	36	40
500		11	29	51	7	0	8	32	30	0	7	0	50
600		11	29	37	30	0	10	15	0	0	8	25	0
700		11	29	23	54	0	11	57	30	0	9	49	10
800		0	0	9	26	0	12	39	30	0	11	13	19
900		11	29	55	50	0	15	22	29	0	12	37	29
1000		11	29	42	13	0	17	4	59	0	14	1	39
1100		11	29	28	37	0	18	47	59	0	15	25	49
1200		0	0	24	9	0	20	30	0	0	16	39	0
1300		0	0	0	33	0	22	12	30	0	18	14	10
1400		11	29	26	56	0	23	55	0	0	19	38	20
1500		11	29	12	30	0	25	17	30	0	21	2	30

Mean Motion of the Sun and Moon for 99 Julian Years.

Jul. Yrs.	M. Mot. ☉				M. Mot. ♀				M. Mot. ♄ ♃ ♅ ♆			
4	0	0	1	49	0	0	4	6	0	0	1	22
8		+	3	39		+	8	22		+	3	44
12			5	28			12	18			5	6
16			7	17			16	24			7	28
20			9	6			20	30			9	50
24			10	56			24	36			10	32
28			12	45			28	42			12	34
32			14	34			32	48			14	56
36			16	24			36	54			16	28
40			18	13			40	0			18	40
44			20	2			44	6			20	2
48			21	51			48	12			21	24
52			23	41		0	52	18			23	41
56			25	30		0	57	24			25	8
60			27	19		1	1	30			27	30
64			29	8		1	5	16			29	52
68			30	58		1	9	42			30	14
72			32	47		1	13	48		1	32	36
76			34	36		1	17	54		1	34	58
80			36	26		1	21	0		1	36	20
84			38	15		1	25	6		1	38	42
88			40	4		1	30	12		1	40	4
92			41	53		1	34	18		1	41	26
96			43	43		1	38	24		1	43	48
1	11	29	45	40		2	4	30		2	45	50
2	11	29	37	20		2	7	36		2	37	42
3	11	29	17	1		2	11	42		2	17	34

EXAMPLE 1. To find the Pl. ☉, ♀, ♄, ♃, ♅, ♆, Jan. 30, 1732.

O. S. 1700 Jan. 2	9	29	37	55	3	7	30	0	0	1	59	20
Years 32 Mon												
R. Days 30												

O. S. 1732, Jan 30 Noon.

EXAMPLE 2. To find the Pl. ☉, ♀, ♄, ♃, ♅, ♆, Feb. 10, 1732.

N. S. 1700 Feb. 10	20	29	47	29	3	8	11	0	0	1	59	21
Years 32 Mot.												
R. Days 9												

N. S. 1732 Feb. 10 Noon.

53 *Mean Motion of the SUN and Fixed Stars for Days, Hours, &c.*

Day	M. M. ☉				M. M. ☉				M. M. ☉				M. M. ☉			
	0	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	0	0	59	8	0	0	1	0	2	28	31	1	16	23		
2	0	1	58	17	0	0	2	0	4	56	32	1	18	51		
3	0	2	57	25	0	0	3	0	7	24	33	1	21	19		
4	0	3	56	33	1	0	4	0	9	51	34	1	23	47		
5	0	4	55	41	1	1	5	0	12	19	35	1	26	14		
6	0	5	54	50	1	1	6	0	14	47	36	1	28	42		
7	0	6	53	58	1	2	7	0	17	15	37	1	31	10		
8	0	7	53	7	1	1	8	0	19	43	38	1	33	38		
9	0	8	52	15	1	1	9	0	22	11	39	1	36	6		
10	0	9	51	23	2	1	10	0	24	38	40	1	38	34		
11	0	10	50	32	2	1	11	0	27	6	41	1	41	1		
12	0	11	49	40	2	2	12	0	29	34	42	1	43	29		
13	0	12	48	48	2	2	13	0	32	2	43	1	45	57		
14	0	13	47	57	2	2	14	0	34	30	44	1	48	25		
15	0	14	47	5	2	2	15	0	36	58	45	1	50	53		
16	0	15	46	13	3	2	16	0	39	26	46	1	53	21		
17	0	16	45	21	3	2	17	0	41	53	47	1	55	48		
18	0	17	44	30	3	2	18	0	44	21	48	1	58	16		
19	0	18	43	38	3	3	19	0	46	49	49	2	0	44		
20	0	19	42	47	3	3	20	0	49	17	50	2	3	12		
21	0	20	41	55	3	3	21	0	51	45	51	2	5	40		
22	0	21	41	1	4	3	22	0	54	13	52	2	8	8		
23	0	22	40	12	4	3	23	0	56	40	53	2	10	36		
24	0	23	39	20	4	3	24	0	59	8	54	2	13	3		
25	0	24	38	28	4	3	25	0	1	36	55	2	15	31		
26	0	25	37	37	4	4	26	1	4	4	56	2	17	59		
27	0	26	36	45	4	4	27	1	6	32	57	2	20	27		
28	0	27	35	53	5	4	28	1	9	0	58	2	22	55		
29	0	28	35	1	5	4	29	1	11	27	59	2	25	23		
30	0	29	34	10	5	4	30	1	13	55	60	2	27	50		

In Leap-Year take out a Day looner for Jan. and Feb. both Stiles.

— *Refract.* To reduce the New to the Old Style, and the contrary. —
From the Hundreds of Christ take their Fourth, adding 2,
and the Days will remain betwixt Old Style and New.

EXAMPLE 1.
In 2736 of Christ.
2 + 4 = 6 —

19 Days Diff. between Old
and New Style

Hence the Dif. of Motion for
Hundreds of Years Julia. & Greg.

EXAMPLE 2.
In 3200 of Christ.
— 1500

2 1500 Days Diff. fr.
— 3 Days Diff. fr. 1600

12 Days less than in 1500
Years Julian from 1600.

I. EQUATION OF TIME.

Mean + for Apparent
Apparent — for Mean.

Arg. Sun's true Place.

Pl.	0.0	1.7	2.8	Pl.
0	m s	m s	m s	0
1	0 08	23 8	45 30	1
2	0 20	8 34	8 35 29	2
3	0 40	8 44	8 24 28	3
4	1 08	53 8	13 27	4
5	1 19	9 28	1 26	5
6	1 39	9 10	7 48 25	6
7	1 58	9 17	7 34 24	7
8	2 18	9 24	7 20 23	8
9	2 37	9 30	7 6 22	9
10	2 56	9 35	6 50 21	10
11	3 15	9 40	6 35 20	11
12	3 34	9 44	6 18 19	12
13	3 52	9 48	6 2 18	13
14	4 11	9 50	5 44 17	14
15	4 29	9 52	5 27 16	15
16	4 46	9 54	5 8 15	16
17	5 4	9 54	4 50 14	17
18	5 21	9 54	4 31 13	18
19	5 37	9 53	4 11 12	19
20	5 54	9 51	3 52 11	20
21	6 10	9 49	3 32 10	21
22	6 25	9 46	3 11 9	22
23	6 40	9 42	2 51 8	23
24	6 55	9 38	2 30 7	24
25	7 9	9 33	2 9 6	25
26	7 23	9 26	1 48 5	26
27	7 36	9 19	1 26 4	27
28	7 48	9 12	1 5 3	28
29	8 1	9 4	0 43 2	29
30	8 12	8 55	0 22 1	30
31	8 23	8 45	0 0 0	31
Pl.	11.5	10.4	9.3	Pl.

Mean — for Apparent
Apparent + for Mean.

II. EQUATION OF TIME.

Mean + for Apparent
Apparent — for Mean.

Arg. Sun's Mean Anomaly.

Sign	Sign	Sign	Sign	Sign	Sign	Sign	Sign	Sign
An.	0	1	2	3	4	5	6	An.
0	m s	m s	m s	m s	m s	m s	m s	0
1	0 03	48 6	39 7	45 6	47 3	57 30	47 30	1
2	0 08	3 55	6 43	7 45	6 43	3 50	29 29	2
3	0 16	4 2	6 47	7 45	6 39	3 43	28 28	3
4	0 24	4 5	6 51	7 45	6 35	3 35	27 27	4
5	0 32	4 16	6 54	7 45	6 30	3 28	26 26	5
6	0 40	4 22	6 58	7 44	6 26	3 20	25 25	6
7	0 48	4 29	7 1	7 44	6 21	3 13	24 24	7
8	0 56	4 35	7 5	7 43	6 16	3 5	23 23	8
9	1 3	4 42	7 8	7 42	6 11	2 58	22 22	9
10	1 11	4 48	7 11	7 41	6 6	2 50	21 21	10
11	1 19	4 54	7 14	7 40	6 1	2 42	20 20	11
12	1 27	5 0	7 17	7 39	5 56	2 34	19 19	12
13	1 35	5 7	7 19	7 37	5 51	2 27	18 18	13
14	1 43	5 12	7 22	7 36	5 45	2 19	17 17	14
15	1 50	5 18	7 25	7 34	5 40	2 11	16 16	15
16	1 58	5 24	7 27	7 32	5 34	2 3	15 15	16
17	2 6	5 30	7 29	7 30	5 28	1 55	14 14	17
18	2 13	5 35	7 31	7 28	5 22	1 47	13 13	18
19	2 21	5 41	7 33	7 25	5 16	1 39	12 12	19
20	2 28	5 46	7 35	7 23	5 10	1 31	11 11	20
21	2 36	5 51	7 36	7 20	5 4	1 22	10 10	21
22	2 43	5 57	7 38	7 18	4 58	1 14	9 9	22
23	2 51	6 2	7 39	7 15	4 51	1 6	8 8	23
24	2 58	6 7	7 41	7 12	4 45	0 58	7 7	24
25	3 6	6 12	7 42	7 9	4 38	0 50	6 6	25
26	3 13	6 17	7 43	7 5	4 32	0 41	5 5	26
27	3 20	6 21	7 43	7 2	4 25	0 33	4 4	27
28	3 27	6 26	7 44	6 59	4 18	0 25	3 3	28
29	3 34	6 30	7 44	6 55	4 11	0 17	2 2	29
30	3 41	6 35	7 45	6 51	4 4	0 8	1 1	30
31	6 43	6 38	7 45	6 47	3 57	0 0	0 0	31
Sign	Sign	Sign	Sign	Sign	Sign	Sign	Sign	Sign
An	11	10	9	8	7	6	An	An

Mean — for Apparent
Apparent + for Mean.

N. B. In our next PAELADIUM (with what we are about to publish in a Quarto Volume) we shall complete our ASTRONOMY.

In Radical Ephemeris, for 7 *s fourty, r. South.

EQUATION of the SUN'S CENTER.

Argument. Mean Anomaly of the SUN.

⊙	Sign. 0	Sign. 1.	Sign. 2	Sign. 3	Sign. 4	Sign. 5	⊙
M	—	—	—	—	—	—	M
A	—	—	—	—	—	—	A
D.	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	D
0	0 0 0	0 56 43	1 38 58	1 55 29	1 41 4	0 58 49	30
1	0 1 59	0 58 25	1 39 55	1 55 30	1 40 4	0 57 2	29
2	0 3 58	1 0 6	1 40 58	1 55 29	1 39 2	0 55 14	28
3	0 5 36	1 1 47	1 41 55	1 55 26	1 37 58	0 53 25	27
4	0 7 54	1 3 27	1 42 50	1 55 21	1 36 52	0 51 35	26
5	0 9 52	1 5 6	1 42 44	1 55 15	1 35 45	0 49 45	25
6	0 11 50	1 6 44	1 44 36	1 55 6	1 34 35	0 47 54	24
7	0 13 48	1 8 21	1 45 26	1 54 55	1 33 24	0 46 2	23
8	0 15 45	1 9 57	1 46 14	1 54 42	1 32 11	0 44 9	22
9	0 17 42	1 11 31	1 47 0	1 54 26	1 30 56	0 42 14	21
10	0 19 39	1 13 4	1 47 44	1 54 8	1 29 40	0 40 18	20
11	0 21 36	1 14 36	1 48 26	1 53 48	1 28 22	0 38 22	19
12	0 23 32	1 16 6	1 49 6	1 53 26	1 27 2	0 36 25	18
13	0 25 28	1 17 35	1 49 44	1 53 2	1 25 41	0 34 28	17
14	0 27 23	1 19 2	1 50 20	1 53 36	1 24 18	0 32 30	16
15	0 29 18	1 20 28	1 50 55	1 52 9	1 22 43	0 30 31	15
16	0 31 12	1 21 53	1 51 28	1 51 39	1 21 27	0 28 32	14
17	0 33 6	1 23 16	1 51 59	1 51 7	1 19 59	0 26 32	13
18	0 34 59	1 24 38	1 52 28	1 50 33	1 18 30	0 24 32	12
19	0 36 52	1 25 58	1 52 55	1 49 57	1 16 59	0 22 31	11
20	0 38 44	1 27 17	1 53 19	1 49 18	1 15 27	0 20 29	10
21	0 40 35	1 28 34	1 53 41	1 48 37	1 13 53	0 18 27	9
22	0 42 26	1 29 50	1 54 1	1 47 54	1 12 18	0 16 25	8
23	0 44 16	1 31 14	1 54 19	1 47 10	1 10 41	0 14 23	7
24	0 44 5	1 32 27	1 54 35	1 46 24	1 9 3	0 12 20	6
25	0 41 54	1 33 28	1 54 50	1 45 36	1 7 24	0 10 17	5
26	0 43 42	1 34 37	1 55 2	1 44 46	1 5 44	0 8 14	4
27	0 51 29	1 35 45	1 55 12	1 43 54	1 4 2	0 6 11	3
28	0 53 15	1 36 51	1 55 20	1 43 0	1 2 19	0 4 8	2
29	0 54 0	1 37 55	1 55 26	1 42 3	1 0 35	0 2 4	1
30	0 55 42	1 38 58	1 55 29	1 41 4	0 58 49	0 0 0	0
⊙	+	+	+	+	+	+	⊙
M	—	—	—	—	—	—	M
A	—	—	—	—	—	—	A
Sign. 11	Sign. 10	Sign. 9	Sign. 8	Sign. 7	Sign. 6		

Use of this and all other Equation Tables. As 60' Dif. Arg. is to the Diff. of two next Equations in Minutes and Seconds, so is the Minutes and Seconds Dif. of Arg. above the least Deg. 10 Minutes and Seconds Dif. of Equation to be added to or subtracted from the Equation to the least Deg. of Arg. for the absolute Equation, to be applied to the Mean Place of the Sun, as the Sign directs for the true Place of the Sun.

Minutes, Seconds, &c. are turned into Decimals by dividing them by 6 — As Decimals multiplied by 6 produce Minutes, Seconds, &c. in the last Decimal multiplied.

TABLE of Refraction.

Arg. Alt. ☉.					
Alt	Refr.	alt	Ref.	alt	ref
☉	act.	☉		☉	
0	I	0	I	0	"
0	33 45	21	2 18	56	36
$\frac{1}{4}$	30 24	22	2 11	57	35
$\frac{1}{2}$	27 35	23	2 5	58	34
$\frac{3}{4}$	25 11	24	1 59	59	32
1	23 7	25	1 54	60	31
$1\frac{1}{4}$	21 20	26	1 49	61	30
$1\frac{1}{2}$	19 46	27	1 44	62	28
$1\frac{3}{4}$	18 22	28	1 40	63	27
2	17 8	29	1 36	64	26
$2\frac{1}{2}$	15 2	30	1 32	65	25
3	13 20	31	1 28	66	24
$3\frac{1}{2}$	11 57	32	1 25	67	23
4	10 48	33	1 22	68	22
$4\frac{1}{2}$	9 50	34	1 19	69	21
5	9 2	35	1 16	70	20
$5\frac{1}{2}$	8 21	36	1 13	71	19
$6\frac{1}{2}$	7 45	37	1 11	72	18
$7\frac{1}{2}$	6 47	38	1 8	73	17
8	6 22	39	1 6	74	16
$8\frac{1}{2}$	6 0	40	1 4	75	15
$9\frac{1}{2}$	5 46	41	1 0	77	13
10	5 22	42	58	78	12
$10\frac{1}{2}$	5 6	43	56	79	11
11	4 52	44	54	80	10
$11\frac{1}{2}$	4 27	45	52	81	9
12	4 5	46	50	82	8
$12\frac{1}{2}$	3 47	47	48	83	7
13	3 31	48	47	84	6
$13\frac{1}{2}$	3 17	49	45	85	5
14	3 4	50	44	86	4
$14\frac{1}{2}$	2 53	51	42	87	3
15	2 43	52	40	88	2
$15\frac{1}{2}$	2 34	53	39	89	1
16	2 26	54	38	90	0

Hourly Motion & app Sem. Diam. of the SUN.

Arg. ☉ M. Anom.					
☉	hour	Sem.	☉	M.	
M. Mot.	Diam.	M.	An.		
An.	☉	☉	An.		
s	0	I	s	0	
0	2 23	15 51	12	0	
$\frac{1}{4}$	6 2	15 51	24		
$\frac{1}{2}$	12 2	15 52	18		
$\frac{3}{4}$	18 2	15 52	12		
1	24 2	15 53	6		
$1\frac{1}{4}$	0 2	15 53	11	0	
$1\frac{1}{2}$	6 2	15 54	24		
$1\frac{3}{4}$	12 2	15 55	18		
2	18 2	15 57	12		
$2\frac{1}{2}$	24 2	15 58	6		
$2\frac{3}{4}$	0 2	15 59	10	0	
$3\frac{1}{4}$	6 2	16 1	24		
$3\frac{1}{2}$	12 2	16 2	18		
$3\frac{3}{4}$	18 2	16 4	12		
4	24 2	16 6	6		
$4\frac{1}{4}$	0 2	16 7	9	0	
$4\frac{1}{2}$	6 2	16 9	24		
$4\frac{3}{4}$	12 2	16 11	18		
$5\frac{1}{4}$	18 2	16 13	12		
$5\frac{1}{2}$	24 2	16 14	6		
$5\frac{3}{4}$	0 2	16 16	8	0	
$6\frac{1}{4}$	6 2	16 17	24		
$6\frac{1}{2}$	12 2	16 18	18		
$6\frac{3}{4}$	18 2	16 20	12		
$7\frac{1}{4}$	24 2	16 21	6		
$7\frac{1}{2}$	0 2	16 22	7	0	
$7\frac{3}{4}$	6 2	16 23	24		
$8\frac{1}{4}$	12 2	16 23	18		
$8\frac{1}{2}$	18 2	16 24	12		
$8\frac{3}{4}$	24 2	16 24	6		
$9\frac{1}{4}$	0 2	16 24	6	0	

Sun's Parallax and D's app Diameter.

Ar. Alt. ☉ or D					
alt	☉	Diam.	alt	☉	Diam.
☉	D	☉	☉	D	☉
☉	D	☉	☉	D	☉
☉	D	☉	☉	D	☉
0	11	11	11		
$\frac{1}{4}$	10	0	0		
$\frac{1}{2}$	10	2	2		
$\frac{3}{4}$	10	3	4		
1	10	5	6		
$1\frac{1}{4}$	10	6	7		
$1\frac{1}{2}$	10	8	9		
$1\frac{3}{4}$	10	9	11		
2	10	10	12		
$2\frac{1}{4}$	10	11	15		
$2\frac{1}{2}$	10	12	16		
$2\frac{3}{4}$	9	14	18		
3	8	15	19		
$3\frac{1}{4}$	8	16	21		
$3\frac{1}{2}$	8	18	23		
$3\frac{3}{4}$	7	19	24		
4	7	20	25		
$4\frac{1}{4}$	7	21	27		
$4\frac{1}{2}$	7	22	28		
$4\frac{3}{4}$	6	23	29		
5	6	23	30		
$5\frac{1}{4}$	5	24	31		
$5\frac{1}{2}$	5	25	32		
$5\frac{3}{4}$	4	26	33		
6	3	26	34		
$6\frac{1}{4}$	3	27	34		
$6\frac{1}{2}$	2	27	35		
$6\frac{3}{4}$	2	27	35		
7	2	28	36		
$7\frac{1}{4}$	1	28	36		
$7\frac{1}{2}$	1	28	36		
$7\frac{3}{4}$	0	29	36		

N. B. In taking out the Numbers from all the Equation Tables, it is shortest to proportion by Minutes and Decimals (to two Places) to such as are acquainted with Decimals.—To others the Minutes and Seconds Diff. of Argument may be multiplied by the Minutes and Seconds Diff. of Equation for the Proportion of Equation to be added to or subtracted from the first Equation for the absolute Equation.—Where Minutes multiplied by Minutes produce Seconds; Minutes by Seconds produce Thirds; Seconds by Seconds Fourths.—And cutting off a Figure to the Right of each

TABLE of the Radical Moon Phases and Merfurs of the Moon,
for Years and Months, Old Style.

1600	Julian or Old Style											
Months	M. Pl. D				M. Pl. Ap. D				M. Pl. Q			
	s	o	i	ii	s	o	i	ii	s	o	i	ii
Jan. I	7	28	7	42	6	8	28	55	10	6	55	28
Feb. I	9	16	35	48	6	11	56	8	9	29	16	58
Mar. O	9	25	34	8	6	15	3	18	9	27	48	0
Apr. O	11	14	0	14	6	18	30	31	9	26	9	38
May O	0	19	17	45	6	21	51	3	9	24	34	11
June O	2	7	45	50	6	25	18	17	9	22	55	42
July O	3	13	3	21	6	28	38	49	9	21	20	22
Aug. O	5	1	31	27	7	2	6	2	0	19	41	53
Sept. O	6	19	59	33	7	5	33	15	9	18	3	23
Octo. O	7	25	17	3	7	8	53	47	9	16	28	4
Nov. O	9	13	45	9	7	12	21	0	9	14	49	34
Dec. O	10	19	2	40	7	15	41	32	9	13	14	19
1700	Julian or Old Style											
Months	M. Pl. D				M. Pl. Ap. D				M. Pl. Q			
	s	o	i	ii	s	o	i	ii	s	o	i	ii
Jan. I	6	5	58	7	9	27	40	10	5	16	44	13
Feb. I	7	24	26	13	10	1	7	23	5	15	5	43
Mar. O	8	3	22	33	10	4	14	33	5	13	36	45
Apr. O	9	21	50	39	10	7	41	46	5	11	58	16
May O	10	27	8	10	10	11	2	18	5	10	22	56
June O	0	15	36	15	10	14	29	32	5	8	44	27
July O	1	20	53	46	10	17	50	4	5	7	9	7
Aug. O	3	9	21	52	10	21	17	17	3	5	30	38
Sept. O	4	27	49	58	10	24	44	30	5	3	52	8
Octo. O	6	3	7	28	10	28	5	2	5	2	16	49
Nov. O	7	21	35	34	11	1	32	15	5	0	38	19
Dec. O	8	26	53	5	11	4	52	42	4	29	1	0
Westjck	M. Mot. D				M. Mot. Ap.				M. Mot. Q ret.			
	s	o	i	ii	s	o	i	ii	s	o	i	ii
300	10	7	50	25	3	19	11	15	4	14	11	15
200	8	15	40	50	7	8	22	30	8	28	22	30
100	6	12	31	15	10	27	33	45	1	12	33	45
0	5	1	21	40	2	16	46	0	5	26	45	0
300	3	9	12	5	6	5	56	15	10	20	56	15
200	1	17	2	30	9	25	7	30	2	15	7	30
100	11	24	52	55	1	14	18	45	7	9	18	45
0	10	2	43	20	5	3	30	0	11	23	30	0
300	8	10	33	45	8	22	21	15	4	7	41	15
200	6	18	24	10	0	11	52	30	8	21	52	30
100	1	6	48	20	0	25	45	0	5	13	45	0
0	7	25	12	30	3	3	37	30	2	5	37	30
1900	2	13	36	40	1	17	30	0	10	27	30	0
1800	9	2	0	50	2	29	22	30	7	19	22	30
1700	3	20	25	0	8	11	15	0	4	11	15	0

TABLE of the Radical Mean Places and Motions of the Moon,
for Years and Months, New Style.

1600												
Gregorian or New Style.												
Months.	M. Pl. D.				M. Pl. Ap. D.				M. Pl. D.			
	1	2	3	4	1	2	3	4	1	2	3	4
Jan. 1	3	16	21	52	6	7	22	4	10	1	17	14
Feb. 1	5	4	49	58	6	10	49	17	9	29	18	44
Mar. 1	5	13	46	18	6	13	56	27	9	18	19	46
Apr. 1	7	2	14	24	6	17	23	40	9	26	41	17
May 1	8	7	31	35	6	20	44	12	9	25	15	57
June 1	9	26	0	0	6	24	31	26	9	23	17	28
July 1	11	1	17	31	6	27	31	58	9	21	1	8
Aug. 1	0	19	45	37	7	0	59	21	9	20	18	39
Sept. 1	2	8	23	43	7	4	26	24	9	18	25	9
Octo. 1	3	13	31	13	7	7	46	56	9	16	18	50
Nov. 1	5	1	39	19	7	11	14	9	9	15	23	20
Dec. 1	6	7	16	50	7	14	34	41	9	13	28	1
1700												
Gregorian or New Style.												
	1	2	3	4	1	2	3	4	1	2	3	4
Jan. 1	1	11	1	42	9	26	26	38	5	17	19	10
Feb. 1	2	29	29	48	9	29	53	51	5	15	18	49
Mar. 1	3	8	26	8	10	3	1	1	5	14	11	44
Apr. 1	4	26	54	14	10	6	18	14	5	12	13	13
May 1	6	2	11	45	10	9	48	46	5	10	28	53
June 1	7	20	39	50	10	13	16	0	5	9	19	24
July 1	8	25	37	21	10	16	36	32	5	7	14	4
Aug. 1	10	14	25	27	10	20	3	45	5	6	5	35
Sept. 1	0	2	33	33	10	23	10	48	5	4	27	1
Octo. 1	1	8	11	3	10	26	51	30	5	2	51	20
Nov. 1	2	26	39	9	11	0	18	43	5	1	13	16
Dec. 1	4	1	56	40	11	3	39	15	4	29	37	57
Years Gr. from 1600	M. Mot. D.				M. Mot. Ap.				M. Mot. D. ret.			
	1	2	3	4	1	2	3	4	1	2	3	4
100	9	24	39	50	3	19	4	34	4	24	8	4
200	7	19	19	40	7	8	9	8	8	18	16	39
300	5	13	59	30	10	27	13	42	1	13	24	17
400	3	21	49	55	2	16	24	57	5	26	35	28
500	1	16	29	45	6	5	29	15	10	10	14	14
600	11	11	9	35	9	24	34	5	2	24	10	37
700	9	5	49	25	3	13	38	30	6	32	19	42
800	7	13	39	50	5	2	44	54	11	23	10	56
900	5	8	16	40	8	21	54	28	4	7	19	0
1000	3	2	59	30	0	10	59	2	8	21	27	5
1100	0	27	39	20	4	0	11	3	1	0	35	9
1200	13	5	29	45	7	19	14	51	3	0	1	14
1300	9	0	9	35	11	8	19	25	10	0	14	28
1400	6	24	49	25	2	27	24	59	2	18	2	33

59 Mean Motion of the Moon for 99 Julian Years.

Julian Years.	M. Mot. D.	M. Mot. Ap.	M. Mot. Q. reg.
1	5 20 42 49	5 12 46 13	2 17 22 3
2	10 41 24 38	10 25 32 6	5 4 44 6
3	15 2 8 27	15 8 18 9	7 22 6 9
4	20 22 51 16	20 21 4 12	10 9 28 32
5	25 13 34 5	25 3 50 15	13 26 50 15
6	30 4 16 54	30 16 36 18	16 14 12 18
7	35 24 59 43	35 29 22 21	19 1 34 21
8	40 15 42 32	40 12 8 24	22 18 36 24
9	45 6 25 21	45 24 54 27	25 6 18 27
10	50 27 8 10	50 7 40 30	28 23 40 30
11	55 17 50 59	55 20 26 33	31 11 2 33
12	0 8 33 48	0 3 12 36	34 28 24 36
13	5 19 16 37	5 15 58 39	37 15 46 39
14	10 7 59 26	10 28 44 42	40 3 8 42
15	15 1 42 15	15 9 30 45	43 20 30 45
16	20 1 25 4	20 24 16 48	46 7 52 48
17	25 0 22 7 53	25 8 7 2 51	49 25 14 51
18	30 12 50 42	30 19 48 54	52 12 36 54
19	35 3 33 31	35 7 2 34 57	55 29 58 57
20	40 24 16 20	40 15 21 0	58 17 21 0
21	45 14 59 9	45 28 7 3	61 4 43 3
22	50 5 41 58	50 10 53 6	64 22 5 6
23	55 26 24 47	55 23 39 9	67 9 27 9
24	0 17 7 36	0 6 25 12	70 26 49 12
25	5 9 23 3	5 10 39 50	73 19 19 43
26	10 18 46 7	10 21 19 41	76 8 39 26
27	15 28 9 11	15 4 59 32	79 27 59 10

EXAMPLE 1. To find the Place of the D, Apogee, and Q, Jan. 1, 1896, at Noon, O. S.

	D	Ap.	Q
O. S. 1896 Jan. 1.	16 58 7	9 27 49 10	5 16 44 13
Yrs. 100 Mot.	10 7 50 25	3 19 11 15	4 14 11 15
8 36	4 17 7 36	10 6 25 12	1 26 49 12
O. S. D. 10	4 11 45 50	1 6 51	31 46
25 21			6 11 32 13

O. S. 1896 Jan. 1, 11 12 41 58 11 24 23 28 11 5 12 0

EXAMPLE 2. To find the Place of the D, Apogee, and Q, Jan. 1, 1896, at Noon, N. S.

	D	Ap.	Q
N. S. 1700 Jan. 1.	1 11 1 42	9 26 26 38	5 17 19 10
Yrs. 100 Mot.	9 24 39 50	3 16 4 34	4 14 8 4
22 96	4 17 7 36	10 6 25 12	1 26 49 12
O. S. D. 22	9 19 52 50	2 27 24	1 9 54
25 21			6 12 7 10

TABLE of the Moon's Motion of the Month Ending 14 April 1871.
Moon continued for Days, Hours, and Hor. Parallaxes of the D.

Days	M. Mot. D				Ab. I S R				D. Hor.		Ap. Hor.		D. Hor.						
	o	i	ii	o	i	ii	iii	iv	An.	mo.	cent.	sec.	An.	mo.					
1	0	13	10	35	0	6	41	0	3	11	0	29	87	14	55	54	29	0	14
2	0	26	21	10	0	13	32	0	6	21	6	29	58	14	55	54	30	2	2
3	1	9	31	45	0	20	3	0	9	32	32	29	41	14	58	54	31	18	18
4	1	22	42	20	0	26	44	0	12	43	18	29	47	14	58	54	42	12	12
5	2	5	48	55	0	33	25	0	15	53	24	29	55	15	0	54	47	0	0
6	2	19	3	30	0	40	6	0	19	4	1	30	7	25	3	54	58	0	11
7	3	2	14	5	0	46	47	0	22	14	1	30	23	15	5	55	6	24	24
8	3	15	24	40	0	53	29	0	25	25	32	30	35	15	8	55	13	18	18
9	3	28	35	15	0	6	10	0	28	36	18	30	51	15	12	55	20	12	12
10	4	11	45	50	1	6	51	0	31	46	24	31	30	15	15	55	43	6	6
11	4	24	56	25	1	13	12	0	34	57	2	31	31	15	19	55	56	0	19
12	5	8	7	0	1	20	13	0	38	8	4	31	54	15	23	56	31	24	24
13	5	21	17	35	1	26	54	0	41	18	12	31	18	15	28	56	39	18	18
14	6	4	48	10	1	32	35	0	44	29	18	31	43	15	33	56	45	14	14
15	6	17	38	45	1	40	16	0	47	40	24	33	7	15	39	57	8	6	6
16	7	0	49	20	1	46	57	0	50	50	3	33	33	15	45	57	30	0	9
17	7	13	59	55	1	53	38	0	54	1	6	33	59	15	51	57	52	24	24
18	7	27	10	30	2	9	19	0	57	11	12	34	20	15	56	58	19	18	18
19	8	10	41	5	2	7	0	1	0	22	18	34	54	16	2	58	31	18	18
20	8	23	31	40	2	13	11	1	3	33	24	35	21	16	6	58	49	5	5
21	9	6	4	15	2	20	22	1	6	43	4	35	48	16	11	59	0	0	0
22	9	19	12	50	2	27	4	1	9	54	6	36	9	16	15	59	21	24	24
23	10	3	3	26	2	33	45	1	13	5	12	36	30	16	19	59	35	18	18
24	10	16	14	0	2	40	26	1	16	15	12	36	50	16	23	59	41	18	18
25	10	29	24	36	2	47	7	1	19	26	24	37	9	16	26	59	48	5	5
26	11	12	35	12	2	53	48	1	22	37	5	37	27	16	29	59	54	0	7
27	11	25	45	46	3	0	29	1	25	47	6	37	42	16	32	59	21	24	24
28	0	8	56	21	3	7	10	1	28	58	12	37	55	16	34	59	30	18	18
29	0	22	6	56	3	13	51	1	31	9	28	38	4	16	36	59	38	18	18
30	1	5	17	31	3	20	32	1	35	19	34	38	9	16	38	59	45	5	5
31	1	18	28	6	3	27	13	1	38	30	6	38	19	16	40	59	51	0	6

in Leap-Yr. takes out for 1 Day Round in Jan. and Feb. both Stiles.

EXAMPLE 3. To find the Place of the Δ , Apogee, and \odot , July 19, 1799, O. S. at Noon?

		D				Ap				M			
O. S. 1700	July 0	1	20	53	46	10	17	50	4	5	7	9	
Years	96	4	17	7	36	10	6	25	12	1	26	49	1
Days	19	0	28	9	11	4	2	59	32	7	27	59	10
		3	10	41	5		2	7		03	14	6	21
										3	25	48	4
O. S2 1799	July 19	3	16	31	38	0	28	21	48	1	11	20	2
Years	1												

TABLE of the Motion of the Moon—Continued for Hours, Minutes, and Seconds.

[illegible]

EXAMPLE 4. To find the Place of \odot , Apogee, and \oslash , July 30, 1700, N. S. at Noon?

N. S. 1700 July 9	8 25 57 21	10 16 36 32	5 07 44 4
Years 96 Mot.	4 17 7 38	10 6 25 32	1 26 49 12
ditto 3	0 28 9 11	4 1 59 32	1 27 59 10
Days 30	1 5 17 31	3 20 32	1 35 19
N. S. 1799 Jul. 30	3 16 31 39	0 28 21 48	1 11 20 23
Noon.			

I. EQUATION of the Moon and Node; double the latter of which is the Equation of the Moon's Anomaly for the Middle State of her Orbit; and is also the 1st Equation of the Moon's Apogee with a contrary Sign.

Argument. The Sun's Mean Anomaly.

M A	Sig. 0		Sig. 1		Sig. 2		Sig. 3		Sig. 4		Sig. 5		M A	
	D	S	D	S	D	S	D	S	D	S	D	S		
	+	+	+	+	+	+	+	+	+	+	+	+		
0	1	1	1	1	1	1	1	1	1	1	1	1	0	
0	0	0	0	5	36	5	1	9	54	8	47	21	30	
1	0	12	0	13	5	47	5	10	9	57	8	53	11	30
2	0	23	0	24	5	58	5	19	10	6	58	11	30	
3	0	35	0	36	6	9	5	28	10	9	3	12	30	
4	0	47	0	48	6	10	5	37	10	14	9	9	11	
5	0	59	0	53	6	20	5	46	10	19	9	14	11	
6	1	10	1	4	6	39	5	55	10	25	9	19	11	
7	1	22	1	14	6	48	6	3	10	30	9	23	11	
8	1	33	1	25	6	58	6	12	10	34	9	27	11	
9	1	45	1	35	7	7	6	20	10	39	9	31	11	
10	1	55	1	45	7	16	6	28	10	43	9	35	11	
11	2	8	1	55	7	25	6	36	10	48	9	39	11	
12	2	19	2	5	7	34	6	44	10	53	9	42	11	
13	2	31	2	15	7	43	6	52	10	58	9	46	11	
14	2	42	2	25	7	52	7	9	10	59	9	50	11	
15	2	53	2	35	8	1	7	8	11	2	9	53	11	
16	3	5	2	45	8	9	7	16	11	6	9	56	11	
17	3	16	2	55	8	17	7	23	11	9	9	58	11	
18	3	27	3	5	8	25	7	31	11	12	10	1	11	
19	3	39	3	15	8	33	7	38	11	14	10	3	10	
20	3	50	3	25	8	41	7	45	11	17	10	5	20	
21	4	1	3	35	8	49	7	52	11	19	10	7	10	
22	4	12	3	45	8	57	7	59	11	21	10	9	10	
23	4	23	3	54	9	4	8	5	11	23	10	11	10	
24	4	33	4	4	9	11	8	12	11	24	10	13	10	
25	4	44	4	14	9	18	8	18	11	26	10	14	20	
26	4	55	4	24	9	25	8	24	11	27	10	15	10	
27	5	5	4	34	9	32	8	30	11	28	10	16	10	
28	5	16	4	44	9	38	8	36	11	29	10	17	10	
29	5	26	4	54	9	45	8	42	11	29	10	18	10	
30	5	36	5	1	9	51	8	47	11	30	10	19	10	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	
M	D	S	D	S	D	S	D	S	D	S	D	S	M	
A	Sig. 11	Sig. 10	Sig. 9	Sig. 8	Sig. 7	Sig. 6	Sig. 5	Sig. 4	Sig. 3	Sig. 2	Sig. 1	Sig. 0	A	

Second Equation of the MOON'S Apogee, with the Eccentricities of the Moon's Orbit, in such Parts as her mean Distance from the ☾ is 1000000. — Sem. Transverse.

Argument. Sun from Moon's Apog. or Annl. Arg't. Ap.

☾ Ap.	Sig. 0.6			Eccen- tricity.	Sig. 1.7			Eccen- tricity.	Sig. 2.8			Eccen- tricity.	☾ Ap.
	+				+				+				
0	0	1	11	Parts	0	1	11	Parts	0	1	11	Parts	0
0	0	0	0	66782	9	28	8	61758	11	40	16	50223	30
1	0	21	5	66776	9	42	23	61438	11	30	55	49837	29
2	0	42	9	66758	9	56	6	61110	11	20	29	49456	28
3	1	3	11	66749	10	9	25	60775	11	8	59	49081	27
4	1	24	11	66688	10	29	9	60432	10	56	28	48713	26
5	1	45	7	66635	10	34	11	60083	10	42	47	48352	25
6	2	5	59	66570	10	45	59	59747	10	27	54	47999	24
7	2	26	46	66494	10	57	2	59365	10	12	6	47654	23
8	2	47	28	66406	11	7	28	58997	9	55	2	47319	22
9	3	8	3	66307	11	17	17	58624	9	36	58	46992	21
10	3	28	30	66196	11	26	27	58245	9	17	56	46677	20
11	3	48	49	66074	11	34	57	57861	8	57	38	46372	19
12	4	8	59	65941	11	42	45	57473	8	36	24	46078	18
13	4	28	59	65796	11	49	51	57081	8	14	8	45797	17
14	4	48	48	65640	11	56	12	56686	7	50	53	45528	16
15	5	8	24	65473	12	1	48	56287	7	26	40	45272	15
16	5	27	48	65296	12	6	37	55885	7	1	31	45030	14
17	5	46	58	65108	12	20	38	55481	6	35	24	44802	13
18	5	5	54	64909	12	13	50	55074	6	8	35	44589	12
19	5	24	34	64706	12	16	11	54666	5	40	53	44391	11
20	5	42	58	64489	12	17	40	54248	5	12	26	44209	10
21	7	1	4	64259	12	18	15	53848	4	43	17	44043	9
22	7	18	52	64019	12	17	56	53439	4	18	30	43893	8
23	7	35	20	63761	12	16	41	53030	4	43	7	43760	7
24	7	53	28	63508	12	24	20	52622	3	12	14	43644	6
25	8	10	14	63223	12	11	18	52215	2	40	53	43545	5
26	8	26	38	62956	12	7	8	51810	2	9	10	43464	4
27	8	42	39	62669	12	1	58	51408	1	37	9	43401	3
28	8	58	15	62373	11	55	47	51009	1	4	54	43356	2
29	9	13	25	62079	11	48	33	50614	0	32	29	43328	1
30	9	28	2	61754	11	40	16	50223	0	0	0	43319	0
☾ Ap.	Sig. 11.5			Eccen- tricity.	Sig. 10.4			Eccen- tricity.	Sig. 9.3			Eccen- tricity.	☾ Ap.

II. EQUATION of the MOON'S Center, for all States of her Variable Orbit.

Argument. Equated Anomaly of the Moon.

D equ. An.	Sign 0									Sign 1									D equ. An.
	Eccentricities.									Eccentricities.									
	45000			55000			65000			45000			55000			65000			
0	1	11	0	1	11	0	1	11	0	1	11	0	1	11	0	1	11	0	
0	0	0	0	0	0	0	0	0	2	27	27	2	58	21	3	28	36	30	
1	0	5	7	0	6	10	0	7	13	2	31	58	3	3	49	3	35	29	
2	0	10	13	0	12	21	0	14	25	2	36	25	3	9	14	3	41	8	
3	0	15	20	0	18	31	0	21	38	2	40	51	3	14	36	3	47	27	
4	0	20	26	0	24	41	0	28	50	2	45	1	3	19	55	3	53	26	
5	0	25	32	0	30	50	0	36	2	2	49	34	3	25	11	4	0	25	
6	0	30	37	0	37	0	0	43	13	2	53	51	3	30	24	4	6	24	
7	0	35	42	0	43	8	0	50	23	2	58	6	3	35	34	4	12	23	
8	0	40	47	0	49	16	0	57	33	3	2	12	3	40	40	4	18	22	
9	0	45	51	0	55	24	1	4	42	3	6	27	3	45	43	4	24	21	
10	0	50	54	1	1	24	1	11	50	3	10	33	3	50	43	4	30	20	
11	0	55	56	1	7	34	1	18	57	3	14	30	3	55	38	4	35	19	
12	1	0	58	1	13	39	1	26	3	3	18	30	4	0	31	4	41	18	
13	1	3	58	1	19	42	1	33	17	3	22	32	4	5	19	4	47	17	
14	1	10	58	1	25	44	1	40	11	3	26	26	4	10	4	4	52	16	
15	1	15	56	1	31	45	1	47	13	3	30	16	4	24	44	4	58	15	
16	1	20	53	1	37	45	1	54	13	3	34	2	4	19	24	5	3	14	
17	1	25	49	1	43	43	2	1	12	3	37	45	4	23	53	5	9	13	
18	1	30	44	1	49	39	2	8	8	3	41	25	4	28	22	5	14	12	
19	1	35	37	1	55	34	2	15	3	3	45	1	4	32	46	5	19	11	
20	1	40	29	2	1	27	2	21	56	3	48	34	4	37	6	5	24	10	
21	1	45	19	2	7	18	2	28	47	3	52	2	4	41	21	5	29	9	
22	1	50	8	2	13	7	2	35	36	3	55	27	4	45	32	5	34	8	
23	1	54	55	2	18	54	2	42	23	3	58	48	4	49	38	5	39	7	
24	1	59	39	2	24	39	2	49	7	4	2	5	4	53	4	5	44	6	
25	2	4	23	2	30	22	2	55	48	4	5	18	4	57	37	5	49	5	
26	2	9	4	2	36	3	3	2	27	4	8	27	5	1	29	5	53	4	
27	2	13	43	2	41	41	3	9	4	4	11	32	5	5	16	5	58	3	
28	2	18	20	2	47	17	3	15	37	4	14	3	5	8	59	6	2	2	
29	2	23	55	2	52	50	3	22	8	4	17	25	5	12	36	6	6	1	
30	2	27	27	2	58	21	3	28	36	4	20	21	5	16	8	6	11	0	
D An.	+			+			+			+			+			+			D An.
Sign 11									Sign 10										

Equation of the Moon's Center, for all States of her Variable Orbit, continued.

Argument. Equated Anomaly of the Moon.

D equ. An.	Sign 2						Sign 3						D equ. An.						
	Eccentricities.						Eccentricities.												
	45000		55000		65000		45000		55000		65000								
0	0	1	4	0	1	11	0	1	4	0	1	11	0						
0	4	20	21	5	16	8	6	11	10	5	8	58	6	17	23	7	25	39	30
1	4	23	9	5	19	36	6	15	16	5	9	14	6	17	47	7	26	13	29
2	4	25	52	5	22	57	6	19	17	5	9	24	6	18	4	7	26	38	28
3	4	28	31	5	26	13	6	23	12	5	9	28	6	18	14	7	26	56	27
4	4	31	6	5	29	25	6	27	0	5	9	26	6	18	17	7	27	6	26
5	4	33	36	5	32	36	6	30	43	5	9	19	6	18	13	7	27	7	25
6	4	36	1	5	35	36	6	34	19	5	9	6	6	18	2	7	27	0	24
7	4	38	21	5	38	23	6	37	48	5	8	47	6	17	44	7	26	45	23
8	4	40	37	5	41	14	6	41	13	5	8	23	6	17	20	7	26	22	22
9	4	42	48	5	43	57	6	44	27	5	7	53	6	16	48	7	25	50	21
10	4	44	55	5	46	35	6	47	37	5	7	17	6	16	9	7	25	11	20
11	4	46	56	5	49	6	6	50	40	5	6	36	6	15	24	7	24	22	19
12	4	48	52	5	51	34	6	53	36	5	5	48	6	14	31	7	23	25	18
13	4	50	44	5	53	52	6	56	25	5	4	55	6	13	31	7	22	20	17
14	4	52	30	5	56	5	6	59	7	5	3	57	6	12	24	7	21	7	16
15	4	54	12	5	58	13	7	1	42	5	2	52	6	11	10	7	19	45	15
16	4	55	48	6	0	18	7	4	10	5	1	42	6	9	49	7	18	15	14
17	4	57	19	6	2	10	7	6	32	5	0	26	6	8	20	7	16	36	13
18	4	58	45	6	3	59	7	8	45	4	59	4	6	6	45	7	14	49	12
19	5	0	6	6	5	44	7	10	52	4	57	37	6	5	3	7	12	54	11
20	5	1	21	6	7	18	7	12	50	4	56	4	6	3	14	7	10	50	10
21	5	2	31	6	8	42	7	14	41	4	54	25	6	1	17	7	8	37	9
22	5	3	36	6	10	12	7	16	26	4	52	41	5	59	14	7	6	17	8
23	5	4	36	6	11	29	7	18	2	4	50	51	5	57	3	7	3	47	7
24	5	5	30	6	12	40	7	19	30	4	48	55	5	54	46	7	1	10	6
25	5	6	18	6	13	44	7	20	51	4	46	54	5	52	21	6	38	24	5
26	5	7	1	6	14	41	7	22	4	4	44	47	5	49	50	6	55	30	4
27	5	7	39	6	15	32	7	23	10	4	42	34	5	47	12	6	52	27	3
28	5	8	11	6	16	16	7	24	8	4	40	16	5	44	27	6	49	16	2
29	5	8	37	6	16	53	7	24	57	4	37	53	5	41	34	6	45	57	1
30	5	8	58	6	17	23	7	25	39	4	35	24	5	38	35	6	42	20	0
	+			+			+			+			+			+			
	Sign 9						Sign 8												

EQUATION of the MOON'S Center, for all States of her *Variable Orbit*, continued.

Argument. Equated Anomaly of the Moon.

D equ. An.	Sign 4						Sign 5						D equ. An.		
	Eccentricities.						Eccentricities.								
	45000		55000		65000		45000		55000		65000				
	—	—	—	—	—	—	—	—	—	—	—	—			
0	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
6	4	35 24	5	38 35	6	42 29	2	42 32	3	20 54	4	0 7	30		
1	4	32 49	5	35 30	6	38 54	2	37 42	3	14 56	3	53 1	20		
2	4	30 9	5	32 17	6	35 10	2	32 47	3	8 58	3	45 49	28		
3	4	27 24	5	28 58	6	31 18	2	27 49	3	2 46	3	38 32	27		
4	4	24 34	5	25 32	6	27 18	2	22 48	3	56 34	3	31 10	26		
5	4	21 38	5	22 0	6	23 10	2	17 44	2	50 19	3	23 43	25		
6	4	18 37	5	18 21	6	18 54	2	12 37	2	44 1	3	16 12	24		
7	4	15 30	5	14 35	6	14 30	2	7 27	2	37 39	3	8 36	23		
8	4	12 19	5	10 43	6	9 58	2	2 14	2	31 14	3	0 55	22		
9	4	9 3	5	6 45	6	5 19	1	56 59	2	24 45	2	53 11	21		
10	4	5 41	5	2 40	6	0 32	1	51 41	2	18 12	2	45 23	20		
11	4	2 14	4	58 29	6	55 37	1	46 21	2	11 37	2	37 31	19		
12	3	58 42	4	54 12	6	50 34	1	40 59	2	4 59	2	29 35	18		
13	3	55 6	4	49 48	5	45 24	1	35 35	1	58 18	2	21 35	17		
14	3	51 25	4	45 19	5	40 7	1	30 8	1	51 34	2	13 33	16		
15	3	47 40	4	40 43	5	34 42	1	24 39	1	44 48	2	5 27	15		
16	3	43 49	4	36 2	5	29 11	1	19 9	1	37 59	1	57 19	14		
17	3	39 54	4	31 15	5	23 32	1	13 37	1	31 9	1	49 8	13		
18	3	35 54	4	26 22	5	17 46	1	8 3	1	24 16	1	40 54	12		
19	3	31 50	4	21 24	5	11 53	1	2 28	1	17 27	1	32 38	11		
20	3	27 42	4	16 19	5	5 58	0	56 52	1	10 25	1	24 19	10		
21	3	23 29	4	11 10	4	59 47	0	51 14	1	3 27	1	15 59	9		
22	3	19 12	4	5 55	4	53 34	0	45 35	0	56 27	1	7 37	8		
23	3	14 50	4	0 35	4	47 14	0	39 58	0	49 27	0	59 13	7		
24	3	10 25	3	55 10	4	40 48	0	34 15	0	42 25	0	50 48	6		
25	3	5 56	3	49 39	4	34 16	0	28 34	0	35 22	0	42 22	5		
26	3	1 22	3	44 3	4	27 38	0	22 52	0	28 19	0	33 55	4		
27	2	56 45	3	38 23	4	20 54	0	17 9	0	21 16	0	25 27	3		
28	2	52 5	3	32 38	4	14 4	0	11 26	0	14 10	0	16 58	2		
29	2	47 20	3	26 48	4	7 8	0	5 42	0	7 5	0	8 29	1		
30	2	42 32	3	20 54	4	0 7	0	0 0	0	0 0	0	0 0	0		
D equ. An.	+		+		+		+		+		+		D equ. An.		
	Sign 7						Sign 6								

7
EQUATION of the MOON'S
VARIATION, correspond-
ent to the foregoing Central
Equation.

Arg. Moon from the Sun.

Arg.	Sig. 0.6		Sig. 1.7		Sig. 2.8		D
	+	+	+	+	+	+	
0	1	1	1	1	1	1	0
1	0	0	32	54	32	54	30
2	1	20	33	33	32	13	29
3	2	39	34	9	31	30	28
4	3	59	34	42	30	45	27
5	4	5	18	35	13	29	26
6	5	6	36	35	42	29	25
7	6	7	54	36	9	28	24
8	7	9	11	36	32	27	23
9	8	10	28	36	52	26	22
10	9	11	44	37	10	25	21
11	10	13	0	37	25	24	20
12	11	14	14	37	38	23	19
13	12	15	27	37	48	22	18
14	13	16	40	37	55	21	17
15	14	17	51	37	59	20	16
16	15	19	0	38	0	19	15
17	16	20	8	37	59	17	14
18	17	21	15	37	55	16	13
19	18	22	20	37	48	15	12
20	19	23	23	37	38	14	11
21	20	24	25	37	25	13	10
22	21	25	26	37	10	11	9
23	22	26	24	36	52	10	8
24	23	27	20	36	32	9	7
25	24	28	14	36	9	7	6
26	25	29	7	35	42	6	5
27	26	29	57	35	13	5	4
28	27	30	45	34	42	3	3
29	28	31	30	34	9	2	2
30	29	32	13	33	33	1	1
31	30	32	54	32	54	0	0
32	31	32	54	32	54	0	0
33	32	32	54	32	54	0	0
34	33	32	54	32	54	0	0
35	34	32	54	32	54	0	0
36	35	32	54	32	54	0	0
37	36	32	54	32	54	0	0
38	37	32	54	32	54	0	0
39	38	32	54	32	54	0	0
40	39	32	54	32	54	0	0
41	40	32	54	32	54	0	0
42	41	32	54	32	54	0	0
43	42	32	54	32	54	0	0
44	43	32	54	32	54	0	0
45	44	32	54	32	54	0	0
46	45	32	54	32	54	0	0
47	46	32	54	32	54	0	0
48	47	32	54	32	54	0	0
49	48	32	54	32	54	0	0
50	49	32	54	32	54	0	0
51	50	32	54	32	54	0	0
52	51	32	54	32	54	0	0
53	52	32	54	32	54	0	0
54	53	32	54	32	54	0	0
55	54	32	54	32	54	0	0
56	55	32	54	32	54	0	0
57	56	32	54	32	54	0	0
58	57	32	54	32	54	0	0
59	58	32	54	32	54	0	0
60	59	32	54	32	54	0	0
61	60	32	54	32	54	0	0
62	61	32	54	32	54	0	0
63	62	32	54	32	54	0	0
64	63	32	54	32	54	0	0
65	64	32	54	32	54	0	0
66	65	32	54	32	54	0	0
67	66	32	54	32	54	0	0
68	67	32	54	32	54	0	0
69	68	32	54	32	54	0	0
70	69	32	54	32	54	0	0
71	70	32	54	32	54	0	0
72	71	32	54	32	54	0	0
73	72	32	54	32	54	0	0
74	73	32	54	32	54	0	0
75	74	32	54	32	54	0	0
76	75	32	54	32	54	0	0
77	76	32	54	32	54	0	0
78	77	32	54	32	54	0	0
79	78	32	54	32	54	0	0
80	79	32	54	32	54	0	0
81	80	32	54	32	54	0	0
82	81	32	54	32	54	0	0
83	82	32	54	32	54	0	0
84	83	32	54	32	54	0	0
85	84	32	54	32	54	0	0
86	85	32	54	32	54	0	0
87	86	32	54	32	54	0	0
88	87	32	54	32	54	0	0
89	88	32	54	32	54	0	0
90	89	32	54	32	54	0	0
91	90	32	54	32	54	0	0
92	91	32	54	32	54	0	0
93	92	32	54	32	54	0	0
94	93	32	54	32	54	0	0
95	94	32	54	32	54	0	0
96	95	32	54	32	54	0	0
97	96	32	54	32	54	0	0
98	97	32	54	32	54	0	0
99	98	32	54	32	54	0	0
100	99	32	54	32	54	0	0

PRECEPTS. By the three foregoing Equations of Δ (Annual, Central, and Variation) applied to her m. Place found by foregoing Examples, the Δ 's true Pl. in her Orbit will be nearly had. What further Correction is necessary (seldom wanted) shall be shewn hereafter.

N. B. The Argument for the Central Equation is had by taking Δ 's Ap. 2 equated from Δ 's Pl. 1. equated, leaving equated An. Δ . The Central Equation is taken out thus.

Ex. Equated An. Δ being $4^{\circ} 5^{\circ} 38'$.
Excentricity of Δ 's Orb. 49376 (by Tab. p. 63.)

Equation	Excent.
Δ Equ ^d . An. $4^{\circ} 5^{\circ} 38'$	$4^{\circ} 19' 44''$ 45000 Tab. p. 66
	$5^{\circ} 19' 42''$ 55000

Dif. $+ 59\ 58$ | 10000
Min^s&Dec^s \times d by 4376 Excess above
[Exc. 45000]

Cutting off 4 Fi-
gures to Right | $+26\ 14$ the proport. Equatⁿ.

Abf. Equation $4\ 45\ 58 =$ Pron. Eq. $+ 1^{\text{st}}$ Eq.
For as 10000 (dif. next Excent^s.) to $59^{\circ} 58''$.
(dif. Equations for Excent^s.) so is 4376 (Exc. above less Excentricity) to $26^{\circ} 14''$. (proport^l. Equatⁿ for present Excentricity) as above.—So for other Cases. For Δ 's Reduction. Say, As $17^{\circ} 45''$. (Dif. between the greatest and least Inc.) to Excess of present Inc. above least (by Tab. p. 68.) so Excess of Reduction (by Tab. p. 69.) above that for least Incl. to present Exc. of Reduction to be added to Reduction by said Table for present Reduction, which being added to, or subtracted from the Δ 's Pl. in her Orbit, as the Sign directs, you will have the Δ 's true Pl. in the Eclips. very near
For Δ 's Lat. As $17^{\circ} 45''$. (Dif. bet. gr. and least In.) to Excess of pres. Inc. above least (by Tab. p. 68.) so Excess of Lat^e. (by Tab. p. 69.) above that for least Incl. to pres. Exc. of Lat^e. to be added to Lat. by said Table for the pres. Lat. required.
N. B. The Equation of Δ 's Center for the middle State of her Orbit, is used after the annual Equation Δ and Ap. 1 equated, whose Argument is Δ 1 equated. Ap. 1 equated. Then follow Equation of Evectⁿ and Variation, correspondent, being 4 easy Lunar Equations, giving Δ 's Orbit Pl. very near the Truth, when applied to her m. Pl. had by foregoing Examples. The proper Reduction and Lat. Table follow. Parallaxes as before. So that all other small Equations are Corrections of this near Approxⁿ.

Si. 11.5 Si. 10.4 Sig. 9.3

58. SECOND EQUATION of the MOON'S NODE. And Present Ex-
cess of Inclination, above the least Inclination of the MOON'S Orbit
to the Ecciptic, 4°. 59' 35".

Argument. Sun from the Moon's Node.

Sig. 0.6				Sig. 1.7				Sig. 2.8					
Eq. Q	Excess ab least Inc.			Eq. Q	Excess ab least Inc.			Eq. Q	Excess ab least Inc.				
0	1	2	3	0	1	2	3	0	1	2	3		
0	0	0	0	17	45	1	16 39	13	22	1	18 43	4	27
1	0	3	3	17	45	1	18 13	13	6	1	17 6	4	11
2	0	6	6	17	44	1	19 43	12	49	1	15 26	3	55
3	0	9	8	17	44	1	21 3	12	34	1	13 40	3	40
4	0	12	10	17	43	1	22 20	12	15	1	11 45	3	25
5	0	15	11	17	40	1	23 31	11	58	1	9 52	3	11
6	0	18	11	17	37	1	24 36	11	41	1	7 49	2	57
7	0	21	10	17	33	1	25 34	11	24	1	5 42	2	43
8	0	24	7	17	28	1	26 27	11	7	1	3 29	2	29
9	0	27	2	17	22	1	27 14	10	49	1	1 11	2	16
10	0	29	56	17	15	1	27 54	10	31	0	58 46	2	4
11	0	32	48	17	8	1	28 28	10	13	0	56 22	1	53
12	0	35	38	17	0	1	28 56	9	55	0	53 51	1	48
13	0	38	25	16	52	1	29 17	9	37	0	51 15	1	33
14	0	41	9	16	44	1	29 31	9	18	0	48 36	1	21
15	0	43	51	16	35	1	29 40	9	59	0	45 52	1	11
16	0	46	30	16	26	1	29 41	8	40	0	43 6	1	2
17	0	49	5	16	17	1	29 36	8	20	0	40 15	0	53
18	0	51	17	16	7	1	29 25	8	0	0	37 22	0	43
19	0	54	6	15	56	1	29 7	7	40	0	34 26	0	38
20	0	56	31	15	44	1	28 42	7	21	0	31 26	0	32
21	0	58	52	15	32	1	28 11	7	2	0	28 25	0	26
22	1	1	9	15	19	1	27 33	6	44	0	25 21	0	21
23	1	3	21	15	6	1	26 49	6	26	0	22 16	0	16
24	1	5	30	14	52	1	25 58	6	8	0	19 8	0	12
25	1	7	33	14	38	1	25 1	5	50	0	15 59	0	8
26	1	9	32	14	24	1	23 57	5	33	0	12 49	0	5
27	1	11	27	14	9	1	22 47	5	16	0	9 37	0	3
28	1	13	16	13	54	1	21 31	4	59	0	6 26	0	2
29	1	15	0	13	38	1	20 9	4	43	0	3 13	0	1
30	1	16	39	13	22	1	18 41	4	27	0	0 0	0	0
Sig. 11.5				Sig. 10.4				Sig. 9.3					

N. B. Adding the Present Excess above the least Inclination, to 4°. 59' 35", gives the present Inclination of the J's Orbit to the Ecciptic.
EXAMPLE. At 7°. 20', the present Excess is 7'. 21", and + 4°. 59' 35" = 5°. 60' 56", for the present Inclination.

The LATITUDE of the MOON to the least and greatest Inclination of her Orbit ($4^{\circ} 59' 35''$ and $5^{\circ} 17' 20''$) with the Excess of Latitude

Arg. D à 2 Equat.										Arg. D à 2 Equated.											
Arg. Lat.	Ex	+	1	7	+	2	8	+	Ex	Arg. Lat.	Exc.	+	1	7	+	2	8	+	Exc.		
Red. for	Red. for	Red. for	Red. for	Red. for	Red. for	Red. for	Red. for	Red. for	Red. for	Lat. for	Exc.	+	Lat. for	Exc.	+	Lat. for	Exc.	+	Exc.		
1. In.	gr.	1. In.	gr.	1. In.	gr.	1. In.	gr.	1. In.	gr.	least In.	gr.	least In.	gr.	least In.	gr.	least In.	gr.	least In.	gr.		
0	1	11	11	1	11	11	11	1	11	0	1	11	11	1	11	11	11	1	11		
00	0	0	5	59	44	5	40	42	0	0	0	0	2	29	39	8	51	4	19	22	
10	14	1	5	46	43	5	33	41	0	5	12	0	19	2	34	9	9	7	4	21	57
20	27	3	5	52	43	5	25	40	0	10	27	0	37	2	38	37	9	22	4	24	27
30	41	5	5	58	44	5	18	39	0	15	39	0	56	2	43	1	9	39	4	26	52
40	54	7	6	3	45	5	9	38	0	20	52	1	14	2	47	23	9	54	4	29	12
51	8	8	6	8	45	5	1	37	0	26	5	1	32	2	51	41	10	9	4	31	27
61	21	10	6	13	46	4	52	36	0	31	17	1	50	3	55	57	10	24	4	33	38
71	35	11	6	17	46	4	42	35	0	36	28	2	9	3	0	9	10	35	4	35	43
81	48	13	6	20	47	4	33	34	0	41	38	2	28	3	4	18	10	54	4	37	43
92	1	15	6	23	47	4	23	33	0	46	48	2	46	3	8	24	11	8	4	39	39
102	14	16	6	26	47	4	12	32	0	51	57	3	5	3	12	26	11	21	4	41	29
112	27	18	6	28	48	4	2	29	0	57	5	3	23	3	16	24	11	37	4	43	14
122	39	20	6	30	48	3	51	28	1	2	13	3	40	3	20	19	11	51	4	44	53
132	52	21	6	31	48	3	40	27	1	7	19	3	58	3	24	11	12	4	4	46	28
143	4	22	6	32	48	3	28	26	1	12	24	4	16	3	27	58	12	15	4	47	57
153	16	24	6	32	48	3	16	24	1	17	27	4	34	3	31	42	12	32	4	49	21
163	27	26	6	32	48	3	4	23	1	22	29	4	52	3	35	22	12	4	4	50	40
173	39	27	6	31	48	2	52	21	1	27	29	5	11	3	38	58	12	58	4	51	53
183	50	28	6	30	48	2	40	19	1	32	28	5	28	3	42	31	13	9	4	53	1
194	1	29	6	28	48	2	27	18	1	37	25	5	46	3	45	59	13	22	4	54	4
204	14	30	6	26	48	2	14	17	1	42	21	6	3	3	49	23	13	34	4	55	1
214	28	32	6	24	47	2	1	15	1	47	15	6	20	3	52	42	13	47	4	55	53
224	42	33	6	20	47	1	48	14	1	52	6	38	3	55	58		13	58	4	56	40
234	43	34	6	17	46	1	35	12	1	56	56	55	3	59	9		14	9	4	57	21
244	51	36	6	12	46	1	22	10	2	1	44	7	11	4	2	16	14	20	4	57	56
255	0	37	6	9	45	1	8	8	2	6	29	7	28	4	5	18	14	31	4	58	26
265	8	38	6	4	44	0	55	6	2	11	12	7	45	4	8	16	14	42	4	58	51
275	17	39	5	58	44	0	41	5	2	15	52	8	2	4	11	9	14	53	4	59	10
285	25	40	5	53	43	0	27	3	2	20	30	8	19	4	13	58	15	2	4	59	24
295	32	41	5	47	42	0	14	1	2	25	6	8	35	4	16	42	15	12	4	59	32
305	39	42	9	40	42	0	0	0	2	29	39	8	51	4	19	22	15	22	4	59	35
Arg. Lat.	+	Ex	+	1	7	+	2	8	+	Arg. Lat.	Exc.	+	1	7	+	2	8	+	Exc.		
Red. for	Red. for	Red. for	Red. for	Red. for	Red. for	Red. for	Red. for	Red. for	Red. for	Lat. for	Exc.	+	Lat. for	Exc.	+	Lat. for	Exc.	+	Exc.		
1. In.	gr.	1. In.	gr.	1. In.	gr.	1. In.	gr.	1. In.	gr.	least In.	gr.	least In.	gr.	least In.	gr.	least In.	gr.	least In.	gr.		
11	5	In	10	4	In	9	3	In	5	N. D	In.	10	5	N. D	In.	9	3	N. D	In.		

The Sem. Diameters and Horizontal Pa-
rallaxes of the Moon, in the Syzygies.

Arg. Equated Anom. Moon.

Seconds to be subtract-
ed from the Sem.
Diam. and Hor. Pa-
rallax of D , out
of Syzygies.

Seconds
to be ad-
ded to D 's
hor. Sem.
Diam. on
her Ake.

Arg. D from the Sun.

Ar. D Alt.

Eqd. An. D	Exce. 45000				Exce. 65000				Equa. An. D	Sem. diam. Par.				Hor. semd			
	Semd.		hor.		Semd.		hor.			D		D		D		D	
	D	P. D	D	P. D	D	P. D	D	P. D		D	P. D	D	P. D	D	P. D	D	P. D
0 0	15	4	55	1	14	47	53	59	12 0	0 0	0	0	12 0	0	0	0	0
6 0	15	5	55	2	14	48	54	0	24 0	6 0	1	1	24 0	3	1	2	1
12 0	15	5	55	4	14	48	54	3	18 0	12 1	2	2	18 0	6	2	3	2
18 0	15	6	55	8	14	50	54	8	12 0	18 1	5	5	12 0	9	2	3	2
24 0	15	7	55	13	14	51	54	15	6 0	24 2	8	8	6 0	12	3	3	2
1 0	15	9	55	19	14	54	54	23	11 0	1 0	3	13	11 0	15	4	4	3
6 15	15	11	55	27	14	57	54	33	24 0	6 5	17	17	24 0	18	5	5	3
12 15	15	14	55	36	15	0	54	46	18 0	12 6	22	22	18 0	21	6	6	3
18 15	15	16	55	46	15	4	54	59	12 0	18 7	27	27	12 0	24	6	6	3
24 15	15	20	55	57	15	8	55	15	6 0	24 9	33	33	6 0	27	7	7	3
2 0	15	23	56	9	15	13	55	32	10 0	2 0	10	37	10 0	30	8	8	3
6 15	15	27	56	23	15	18	55	50	24 0	6 11	41	41	24 0	33	9	9	3
12 15	15	30	56	37	15	23	56	10	18 0	12 12	45	45	18 0	36	9	9	3
18 15	15	34	56	52	15	29	56	31	12 0	18 13	48	48	12 0	39	10	10	3
24 15	15	39	57	7	15	35	56	53	6 0	24 13	49	49	6 0	42	11	11	3
3 0	15	43	57	23	15	41	57	16	9 0	3 0	13	50	9 0	45	11	11	3
6 15	15	48	57	39	15	47	57	39	24 0	6 13	49	49	24 0	48	12	12	3
12 15	15	52	57	56	15	54	58	3	18 0	12 13	48	48	18 0	51	12	12	3
18 15	15	57	58	12	16	1	58	27	12 0	18 12	45	45	12 0	54	13	13	3
24 15	15	1	58	28	16	7	58	50	6 0	23 11	41	41	6 0	57	13	13	3
4 0	16	5	58	44	16	13	59	14	8 0	4 0	10	37	8 0	60	14	14	3
6 16	16	9	58	59	16	20	59	36	24 0	6 9	33	33	24 0	61	14	14	3
12 16	16	13	59	13	16	26	59	58	18 0	12 7	27	27	18 0	66	15	15	3
18 16	16	17	59	26	16	31	60	17	12 0	18 6	22	22	12 0	69	15	15	3
24 16	16	20	59	38	16	36	60	35	6 0	24 5	17	17	6 0	74	15	15	3
5 0	16	23	59	48	16	40	60	52	7 0	5 0	3	13	7 0	75	16	16	3
6 16	16	25	59	37	16	44	61	5	24 0	6 2	8	8	24 0	78	16	16	3
12 16	16	27	60	3	16	47	61	16	18 0	12 1	5	5	18 0	81	16	16	3
18 16	16	28	60	8	16	49	61	23	12 0	18 1	4	4	12 0	84	16	16	3
24 16	16	29	60	12	16	50	61	28	6 0	24 0	4	4	6 0	87	16	16	3
6 0	16	30	60	14	16	51	61	30	6 0	6 0	0	0	6 0	90	16	16	3

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EQUATION of the MOON'S CENTER, for the Middle State of her Orbit,
 being her mean elliptic Equation, for Eccentricity .05505 to mean Dis-
 tance $D \approx \odot 1$.

Argument. Equated Anomaly of the Moon.

D equ. An.	Sign 0	Sign 1	Sign 2	Sign 3	Sign 4	Sign 5	D equ. An.
0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0
1	0 6 11	3 4 1	5 19 55	6 18 14	5 35 53	3 15 4	29
2	0 12 22	3 9 26	5 23 17	6 18 31	5 32 40	3 9 1	28
3	0 18 32	3 14 48	5 26 34	6 18 47	5 29 20	3 2 54	27
4	0 24 42	3 20 7	5 29 46	6 18 44	5 25 53	2 56 43	26
5	0 30 52	3 25 24	5 32 53	6 18 40	5 22 21	2 50 28	25
6	0 37 2	3 30 38	5 35 54	6 18 29	5 18 42	2 44 9	24
7	0 43 11	3 35 48	5 38 49	6 18 11	5 14 56	2 37 47	23
8	0 49 19	3 40 55	5 41 38	6 17 46	5 11 4	2 31 21	22
9	0 55 27	3 45 58	5 44 21	6 17 14	5 7 5	2 24 51	21
10	1 1 34	3 50 57	5 46 58	6 16 36	5 2 59	2 18 18	20
11	1 7 40	3 55 53	5 49 29	6 15 50	4 58 47	2 11 42	19
12	1 13 45	4 0 45	5 51 55	6 14 57	4 54 29	2 5 4	18
13	1 19 48	4 5 34	5 54 15	6 13 57	4 50 5	1 58 23	17
14	1 25 50	4 10 19	5 56 29	6 12 50	4 45 36	1 51 39	16
15	1 31 52	4 15 0	5 58 37	6 11 36	4 41 1	1 44 52	15
16	1 37 52	4 19 37	6 0 39	6 10 15	4 36 20	1 38 3	14
17	1 43 50	4 24 10	6 2 34	6 8 47	4 31 33	1 31 12	13
18	1 49 47	4 28 38	6 4 23	6 7 12	4 26 39	1 24 18	12
19	1 55 42	4 33 2	6 6 6	6 5 29	4 21 40	1 17 23	11
20	2 1 35	4 37 22	6 7 42	6 3 39	4 16 24	1 10 27	10
21	2 7 26	4 41 38	6 9 13	6 1 42	4 11 23	1 3 29	9
22	2 13 15	4 45 49	6 10 37	5 59 38	4 6 7	0 56 30	8
23	2 19 2	4 49 55	6 11 54	5 57 28	4 0 46	0 49 29	7
24	2 24 48	4 53 57	6 13 5	5 55 11	4 55 21	0 42 27	6
25	2 30 32	4 57 55	6 14 10	5 52 47	3 49 51	0 35 23	5
26	2 36 14	5 1 48	6 15 8	5 50 16	3 44 16	0 28 19	4
27	2 41 53	5 5 36	6 15 59	5 47 38	3 38 30	0 21 15	3
28	2 47 29	5 9 19	6 16 43	5 44 52	3 32 50	0 14 10	2
29	2 53 2	5 12 56	6 17 20	5 42 0	3 27 0	0 7 5	1
30	2 58 33	5 16 28	6 17 5	5 39 0	3 21 4	0 0 0	0
D equ. An.	+	+	+	+	+	+	D equ. An.
	Sign 11	Sign 10	Sign 9	Sign 8	Sign 7	Sign 6	

EQUATION OF EVJECTION, or *Difference between the Mean and True*
elliptic Equation.

Arg. Moon from Sun, + Ap. Moon from Sun.

Ar. Ev.	Sig. 0	Sig. 1.	Sig. 2	Sig. 3	Sig. 4	Sig. 5	Ar. Ev.
0	0 1 11	0 1 11	0 1 11	0 1 11	0 1 11	0 1 11	0
0	0 0 0	0 39 50	1 9 22	1 20 42	1 10 24	0 40 52	30
1	0 1 24	0 41 2	1 10 4	1 20 43	1 9 42	0 39 38	29
2	0 2 47	0 42 14	1 10 45	1 20 42	1 8 58	0 38 23	28
3	0 4 10	0 43 25	1 11 25	1 20 39	1 8 13	0 37 7	27
4	0 5 33	0 44 35	1 12 4	1 20 35	1 7 27	0 35 50	26
5	0 6 56	0 45 44	1 12 41	1 20 30	1 6 40	0 34 33	25
6	0 8 19	0 46 52	1 13 17	1 20 23	1 5 52	0 33 15	24
7	0 9 42	0 47 59	1 13 51	1 20 15	1 5 2	0 32 57	23
8	0 11 5	0 49 6	1 14 24	1 20 5	1 4 11	0 32 38	22
9	0 12 27	0 50 12	1 14 56	1 19 54	1 3 18	0 29 19	21
10	0 13 49	0 51 17	1 15 27	1 19 41	1 2 24	0 27 59	20
11	0 15 11	0 52 21	1 15 56	1 19 27	1 1 29	0 26 37	19
12	0 16 34	0 53 24	1 16 24	1 19 11	1 0 33	0 25 17	18
13	0 17 53	0 54 26	1 16 50	1 18 54	0 59 36	0 23 55	17
14	0 19 13	0 55 27	1 17 15	1 18 35	0 58 38	0 22 33	16
15	0 20 36	0 56 27	1 17 39	1 18 15	0 57 39	0 21 11	15
16	0 21 56	0 57 25	1 18 1	1 17 53	0 56 39	0 19 48	14
17	0 23 16	0 58 26	1 18 22	1 17 39	0 55 38	0 18 25	13
18	0 24 35	0 59 23	1 18 41	1 17 6	0 54 36	0 17 1	12
19	0 25 54	1 0 19	1 18 59	1 16 40	0 53 32	0 15 37	11
20	0 27 13	1 1 14	1 19 16	1 16 13	0 52 27	0 14 13	10
21	0 28 31	1 2 8	1 19 31	1 15 44	0 51 21	0 12 48	9
22	0 29 49	1 3 1	1 19 45	1 15 14	0 50 15	0 11 23	8
23	0 31 6	1 3 53	1 19 57	1 14 43	0 49 8	0 9 58	7
24	0 32 23	1 4 44	1 20 8	1 14 16	0 48 0	0 8 33	6
25	0 33 39	1 5 33	1 20 17	1 13 36	0 46 51	0 7 8	5
26	0 34 54	1 6 21	1 20 25	1 13 9	0 45 42	0 5 43	4
27	0 36 9	1 7 8	1 20 31	1 12 23	0 44 30	0 4 18	3
28	0 37 23	1 7 54	1 20 36	1 12 45	0 43 16	0 2 52	2
29	0 38 37	1 8 35	1 20 40	1 11 5	0 42 1	0 1 26	1
30	0 39 50	1 9 22	1 20 42	1 10 24	0 40 51	0 0 0	0
Ar. Ev.	+	+	+	+	+	+	Ar. Ev.
	Sig. 11	Sig. 10	Sig. 9	Sig. 8	Sig. 7	Sig. 6	

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EQUATION of the MOON'S CENTER, for the Middle State of her Orbit,
 being her mean elliptic Equation, for *Eccentricity* .05505 to mean Dis-
 tance $D \propto \ominus 1$.

Argument, Equated Anomaly of the Moon.

D	Sign 0	Sign 1	Sign 2	Sign 3	Sign 4	Sign 5	D
equ.	—	—	—	—	—	—	equ.
An.	—	—	—	—	—	—	An.
0	0 0 0	2 58 33	5 16 28	6 17 50	5 39 0	3 21 4	30
1	0 6 11	3 4 1	5 19 55	6 18 14	5 35 53	3 15 4	29
2	0 12 22	3 9 26	5 23 17	6 18 31	5 32 40	3 9 1	28
3	0 18 32	3 14 48	5 26 34	6 18 47	5 29 20	3 2 54	27
4	0 24 42	3 20 7	5 29 46	6 18 44	5 25 53	2 56 43	26
5	0 20 52	3 25 24	5 32 53	6 18 40	5 22 21	2 50 28	25
6	0 37 2	3 30 38	5 35 34	6 18 29	5 18 42	2 44 9	24
7	0 43 11	3 35 48	5 38 49	6 18 11	5 14 56	2 37 47	23
8	0 49 19	3 40 55	5 41 38	6 17 46	5 11 4	2 31 21	22
9	0 55 27	3 45 58	5 44 21	6 17 14	5 7 5	2 24 51	21
10	1 1 34	3 50 57	5 46 58	6 16 36	5 2 59	2 18 18	20
11	1 7 40	3 55 53	5 49 29	6 15 50	4 58 47	2 11 42	19
12	1 13 45	4 0 46	5 51 55	6 14 57	4 54 29	2 5 4	18
13	1 19 48	4 5 34	5 54 15	6 13 57	4 50 5	1 58 23	17
14	1 25 50	4 10 19	5 56 29	6 12 50	4 45 36	1 51 39	16
15	1 31 52	4 15 0	5 58 37	6 11 36	4 41 1	1 44 52	15
16	1 37 52	4 19 37	6 0 39	6 10 15	4 36 20	1 38 1	14
17	1 43 50	4 24 10	6 2 34	6 8 47	4 31 33	1 31 12	13
18	1 49 47	4 28 38	6 4 23	6 7 12	4 26 39	1 24 18	12
19	1 55 42	4 33 2	6 6 6	6 5 29	4 21 40	1 17 21	11
20	2 1 35	4 37 22	6 7 43	6 3 39	4 16 24	1 10 27	10
21	2 7 26	4 41 38	6 9 13	6 1 42	4 11 23	1 3 29	9
22	2 13 15	4 45 49	6 10 37	5 59 38	4 6 7	0 56 30	8
23	2 19 2	4 49 55	6 11 54	5 57 28	4 0 46	0 49 29	7
24	2 24 48	4 53 57	6 13 5	5 55 17	4 55 21	0 42 27	6
25	2 30 32	4 57 55	6 14 10	5 52 47	3 49 51	0 35 23	5
26	2 36 14	5 1 48	6 15 8	5 50 16	3 44 16	0 28 19	4
27	2 41 53	5 5 36	6 15 59	5 47 38	3 38 36	0 21 15	3
28	2 47 29	5 9 19	6 16 43	5 44 52	3 32 50	0 14 10	2
29	2 53 2	5 12 56	6 17 20	5 42 0	3 27 0	0 7 5	1
30	2 58 33	5 16 28	6 17 5	5 39 0	3 21 4	0 0 0	0
D	+	+	+	+	+	+	D
equ.	Sign 11	Sign 10	Sign 9	Sign 8	Sign 7	Sign 6	equ.
An.	—	—	—	—	—	—	An.

EQUATION of EVJECTION, or *Difference* between the *Mean* and *True* elliptic Equation.

Arg. Moeth from Sun, + Ap. Moon from Sun.

Ar. Ev.	Sig. 0	Sig. 1	Sig. 2	Sig. 3	Sig. 4	Sig. 5	Ar. Ev.
0	0 1 11	0 1 11	0 1 11	0 1 11	0 1 11	0 1 11	0
0	0 0 0	0 39 50	1 9 22	1 20 42	1 10 24	0 40 52	30
1	0 1 24	0 41 2	1 10 4	1 20 43	1 9 42	0 39 38	29
2	0 2 47	0 42 14	1 10 45	1 20 42	1 8 58	0 38 23	28
3	0 4 10	0 43 25	1 11 25	1 20 39	1 8 13	0 37 7	27
4	0 5 33	0 44 35	1 12 4	1 20 35	1 7 27	0 35 50	26
5	0 6 56	0 45 44	1 12 41	1 20 30	1 6 40	0 34 33	25
6	0 8 19	0 46 52	1 13 17	1 20 23	1 5 52	0 33 15	24
7	0 9 42	0 47 59	1 13 51	1 20 15	1 5 2	0 31 57	23
8	0 11 5	0 49 6	1 14 24	1 20 5	1 4 11	0 30 38	22
9	0 12 27	0 50 12	1 14 56	1 19 54	1 3 18	0 29 19	21
1	0 13 49	0 51 17	1 15 27	1 19 41	1 2 24	0 27 59	20
11	0 15 11	0 52 21	1 15 56	1 19 27	1 1 29	0 26 38	19
12	0 16 33	0 53 24	1 16 24	1 19 11	1 0 33	0 25 17	18
13	0 17 54	0 54 26	1 16 50	1 18 54	0 59 36	0 23 55	17
14	0 19 15	0 55 27	1 17 15	1 18 35	0 58 31	0 22 33	16
15	0 20 36	0 56 27	1 17 39	1 18 15	0 57 39	0 21 11	15
16	0 21 56	0 57 23	1 18 1	1 17 53	0 56 39	0 19 48	14
17	0 23 16	0 58 26	1 18 22	1 17 30	0 55 38	0 18 25	13
18	0 24 35	0 59 23	1 18 41	1 17 6	0 54 36	0 17 1	12
19	0 25 54	1 0 19	1 18 59	1 16 40	0 53 32	0 15 37	11
20	0 27 13	1 1 14	1 19 16	1 16 13	0 52 27	0 14 13	10
21	0 28 31	1 2 8	1 19 31	1 15 44	0 51 23	0 12 48	9
22	0 29 49	1 3 1	1 19 45	1 15 14	0 50 16	0 11 23	8
23	0 31 6	1 3 53	1 19 57	1 14 43	0 49 8	0 9 58	7
24	0 32 23	1 4 44	1 20 8	1 14 16	0 48 0	0 8 33	6
25	0 33 39	1 5 33	1 20 17	1 13 36	0 46 51	0 7 8	5
26	0 34 54	1 6 21	1 20 25	1 13 5	0 45 41	0 5 43	4
27	0 36 9	1 7 8	1 20 31	1 12 23	0 44 30	0 4 18	3
28	0 37 23	1 7 54	1 20 36	1 11 45	0 43 18	0 3 52	2
29	0 38 37	1 8 35	1 20 40	1 11 5	0 42 5	0 2 26	1
30	0 39 50	1 9 22	1 20 42	1 10 24	0 40 51	0 0 0	0
Ar. Ev.	+	+	+	+	+	+	Ar. Ev.
	Sig. 11	Sig. 10	Sig. 9	Sig. 8	Sig. 7	Sig. 6	

the preceding TABLE OF

at a *mean* inclination
the Refl. allowed for
in the preceding Ta-
ble of *Variation*.

— true Long. \odot .

Arg. γ in Orb.—true
Long. \odot .

3		4		5		D a ⊙	D 10 6		1 7 2		8	
—		—		—			—		—		—	
I	"	I	"	I	"	⊙	0	1	2	3	4	5
1	57	36	21	36	8	30	0	0	6	2	6	2
3	21	37	1	35	25	29	1	0	14	6	9	5
4	44	37	39	34	36	28	2	0	29	6	15	5
6	7	38	14	33	46	27	3	0	43	6	21	5
7	29	38	47	32	54	26	4	0	58	6	27	5
8	51	39	17	31	59	25	5	1	12	6	32	5
10	12	39	44	31	2	24	6	1	26	6	37	5
11	33	40	8	30	3	23	7	1	41	6	41	5
12	53	40	30	29	1	22	8	1	55	6	45	4
14	13	40	49	27	57	21	9	2	9	6	48	4
15	32	41	5	26	51	20	10	2	23	6	51	4
16	50	41	18	25	43	19	11	2	37	6	54	4
18	6	41	28	24	33	18	12	2	50	6	56	4
19	21	41	35	23	22	17	13	3	3	6	57	3
20	35	41	39	22	9	16	14	3	16	6	57	3
21	48	41	41	20	54	15	15	3	29	6	57	3
22	59	41	40	19	38	14	16	3	41	6	57	3
24	9	41	35	18	20	13	17	3	53	6	57	3
25	17	42	27	17	1	12	18	4	5	6	56	2
26	23	41	16	15	40	11	19	4	17	6	54	2
27	28	41	2	14	18	10	20	4	28	6	51	2
28	31	40	54	12	55	9	21	4	39	6	48	2
29	32	40	25	11	31	8	22	4	50	6	45	1
30	33	40	3	10	7	7	23	5	0	6	41	1
31	34	39	38	8	42	6	24	5	10	6	37	1
32	35	39	10	7	16	5	25	5	28	6	32	1
33	36	38	39	5	50	4	26	5	30	6	27	0
34	37	38	5	4	23	3	27	5	30	6	22	0
35	38	37	29	2	56	2	28	5	30	6	15	0
36	39	37	1	1	28	1	29	5	30	6	9	0
37	40	36	0	0	0	0	30	5	30	6	2	0
38	41	35	0	0	0	0	31	5	30	6	0	0
39	42	34	0	0	0	0	32	5	30	6	0	0
40	43	33	0	0	0	0	33	5	30	6	0	0
41	44	32	0	0	0	0	34	5	30	6	0	0
42	45	31	0	0	0	0	35	5	30	6	0	0
43	46	30	0	0	0	0	36	5	30	6	0	0
44	47	29	0	0	0	0	37	5	30	6	0	0
45	48	28	0	0	0	0	38	5	30	6	0	0
46	49	27	0	0	0	0	39	5	30	6	0	0
47	50	26	0	0	0	0	40	5	30	6	0	0
48	51	25	0	0	0	0	41	5	30	6	0	0
49	52	24	0	0	0	0	42	5	30	6	0	0
50	53	23	0	0	0	0	43	5	30	6	0	0
51	54	22	0	0	0	0	44	5	30	6	0	0
52	55	21	0	0	0	0	45	5	30	6	0	0
53	56	20	0	0	0	0	46	5	30	6	0	0
54	57	19	0	0	0	0	47	5	30	6	0	0
55	58	18	0	0	0	0	48	5	30	6	0	0
56	59	17	0	0	0	0	49	5	30	6	0	0
57	60	16	0	0	0	0	50	5	30	6	0	0
58	61	15	0	0	0	0	51	5	30	6	0	0
59	62	14	0	0	0	0	52	5	30	6	0	0
60	63	13	0	0	0	0	53	5	30	6	0	0
61	64	12	0	0	0	0	54	5	30	6	0	0
62	65	11	0	0	0	0	55	5	30	6	0	0
63	66	10	0	0	0	0	56	5	30	6	0	0
64	67	9	0	0	0	0	57	5	30	6	0	0
65	68	8	0	0	0	0	58	5	30	6	0	0
66	69	7	0	0	0	0	59	5	30	6	0	0
67	70	6	0	0	0	0	60	5	30	6	0	0
68	71	5	0	0	0	0	61	5	30	6	0	0
69	72	4	0	0	0	0	62	5	30	6	0	0
70	73	3	0	0	0	0	63	5	30	6	0	0
71	74	2	0	0	0	0	64	5	30	6	0	0
72	75	1	0	0	0	0	65	5	30	6	0	0
73	76	0	0	0	0	0	66	5	30	6	0	0
74	77	0	0	0	0	0	67	5	30	6	0	0
75	78	0	0	0	0	0	68	5	30	6	0	0
76	79	0	0	0	0	0	69	5	30	6	0	0
77	80	0	0	0	0	0	70	5	30	6	0	0
78	81	0	0	0	0	0	71	5	30	6	0	0
79	82	0	0	0	0	0	72	5	30	6	0	0
80	83	0	0	0	0	0	73	5	30	6	0	0
81	84	0	0	0	0	0	74	5	30	6	0	0
82	85	0	0	0	0	0	75	5	30	6	0	0
83	86	0	0	0	0	0	76	5	30	6	0	0
84	87	0	0	0	0	0	77	5	30	6	0	0
85	88	0	0	0	0	0	78	5	30	6	0	0
86	89	0	0	0	0	0	79	5	30	6	0	0
87	90	0	0	0	0	0	80	5	30	6	0	0
88	91	0	0	0	0	0	81	5	30	6	0	0
89	92	0	0	0	0	0	82	5	30	6	0	0
90	93	0	0	0	0	0	83	5	30	6	0	0
91	94	0	0	0	0	0	84	5	30	6	0	0
92	95	0	0	0	0	0	85	5	30	6	0	0
93	96	0	0	0	0	0	86	5	30	6	0	0
94	97	0	0	0	0	0	87	5	30	6	0	0
95	98	0	0	0	0	0	88	5	30	6	0	0
96	99	0	0	0	0	0	89	5	30	6	0	0
97	100	0	0	0	0	0	90	5	30	6	0	0
98	101	0	0	0	0	0	91	5	30	6	0	0
99	102	0	0	0	0	0	92	5	30	6	0	0
100	103	0	0	0	0	0	93	5	30	6	0	0

I. TABLE of the Moon's LATITUDE.

Arg. D in Orb. & \odot correct.

D a 0	0.N			1.N			2.N			D a 0
	6.S			7.S			8.S			
0	0	1	11	0	1	11	0	1	11	0
0	0	0	0	2	34	25	4	27	38	30
1	0	5	23	2	39	4	4	30	18	29
2	0	10	46	2	43	39	4	32	53	28
3	0	16	9	2	48	12	4	35	22	27
4	0	21	32	2	52	42	4	37	47	26
5	0	26	54	2	57	9	4	40	7	25
6	0	32	16	3	1	33	4	42	21	24
7	0	37	37	3	5	53	4	44	30	23
8	0	42	58	3	10	10	4	46	34	22
9	0	48	18	3	14	23	4	48	33	21
10	0	53	37	3	18	33	4	50	27	20
11	0	58	55	3	22	39	4	52	15	19
12	1	4	11	3	26	42	4	53	58	18
13	1	9	27	3	30	41	4	55	36	17
14	1	14	42	3	34	36	4	57	8	16
15	1	19	55	3	38	27	4	58	35	15
16	1	25	6	3	42	14	4	59	56	14
17	1	30	16	3	45	57	5	1	12	13
18	1	35	24	3	49	36	5	2	22	12
19	1	40	31	3	53	11	5	3	26	11
20	1	45	36	3	56	41	5	4	25	10
21	1	50	39	4	0	7	5	5	19	9
22	1	55	40	4	3	29	5	6	7	8
23	2	0	39	4	6	47	5	6	50	7
24	2	5	36	4	9	57	5	7	26	6
25	2	10	30	4	13	7	5	7	57	5
26	2	15	22	4	16	11	5	8	26	4
27	2	20	12	4	19	10	5	8	43	3
28	2	24	59	4	22	4	5	8	57	2
29	2	29	43	4	24	53	5	9	3	1
30	2	34	25	4	27	38	5	9	8	0
D a 0	11.S			10.S			9.S			D a 0
	5.N			4.N			4.N			

II. TABLE of the Moon's LATITUDE

Arg. D & $\odot + \odot$ & \odot .

	0.N			1.N			2.N			
	6.S			7.S			8.S			
0	1	2	3	1	2	3	1	2	3	0
0	0	0	0	4	23	7	39	30		30
1	0	9	4	4	33	7	43	29		29
2	0	19	4	4	43	7	48	28		28
3	0	28	4	4	49	7	52	27		27
4	0	37	4	4	56	7	56	26		26
5	0	46	5	4		8	0	25		25
6	0	55	5	11		8	4	24		24
7	1	5	5	19		8	7	23		23
8	1	14	5	26		8	11	22		22
9	1	23	5	34		8	14	21		21
10	1	32	5	41		8	18	20		20
11	1	41	5	48		8	21	19		19
12	1	50	5	55		8	24	18		18
13	1	59	6			8	27	17		17
14	2	8	6	9		8	30	16		16
15	2	17	6	15		8	32	15		15
16	2	26	6	22		8	34	14		14
17	2	35	6	28		8	36	13		13
18	2	44	6	34		8	38	12		12
19	2	52	6	40		8	40	11		11
20	3	1	6	46		8	42	10		10
21	3	10	6	52		8	43	9		9
22	3	18	6	57		8	45	8		8
23	3	27	7			8	46	7		7
24	3	35	7			8	47	6		6
25	3	44	7	14		8	48	5		5
26	3	52	7	19		8	48	4		4
27	4	1	7	24		8	49	3		3
28	4	9	7	29		8	49	2		2
29	4	17	7	34		8	50	1		1
30	4	25	7	39		8	50	0		0
0	11.S			10.S			9.S			0
	5.N			4.N			3.N			

NOTE, D & \odot signifies $\text{D} - \odot$; $\text{D} \hat{=} \odot$, or $\odot \hat{=} \text{D}$, the same as $\text{D} - \odot$, and $\odot - \odot$. So that *from*, denotes — the latter Place from the former, when we say *D from \odot* , or $\odot \hat{=} \text{D}$'s Apogee, &c.

N. B. Sig^s. | 0.1.2. N.A. | 6. 7. 8.S.A. | from and to Ecciptic.
3.4.5. N.D. | 9.10.11. S.D.

**RADICAL DIARY, (1756) serving for PERPETUITY, by Mean
of small Equations, for Lat. Lond. 51°. 32'. N.**

JANUARY, xxxi Days.

FEBRUARY, xxviii Days.

☿.Cl.	☿.Pla.	Decln.	R.A.	D.R.A.	☿.Cl.	☿.Pla.	Decln.	R.A.	D.R.A.	
1	29	11	38	22	0	58	28	39	18	51
2	57	12	39	25	53	28	45	18	55	
3	25	13	40	22	47	28	51	18	59	
4	52	14	42	23	40	28	57	19	4	
5	18	15	43	22	33	28	7	3	8	
6	44	16	44	22	26	28	8	9	12	
7	10	17	45	22	18	28	9	14	17	
8	35	18	46	22	10	29	0	19	21	
9	0	19	47	22	1	29	1	25	26	
10	25	20	49	21	52	29	2	30	30	
11	49	21	50	21	43	29	3	36	34	
12	12	22	51	21	33	29	4	40	38	
13	35	23	52	21	22	29	5	45	43	
14	57	24	53	21	11	29	6	50	47	
15	10	25	54	21	0	29	7	54	52	
16	37	26	55	20	49	29	8	58	56	
17	56	27	56	20	37	30	0	2	0	
18	15	28	57	20	24	30	1	6	4	
19	33	29	58	20	12	30	2	10	8	
20	50	30	59	19	59	30	3	13	13	
21	7	2	0	19	45	30	4	16	17	
22	23	3	1	19	31	30	5	20	21	
23	38	4	2	19	17	30	6	22	25	
24	52	5	3	19	2	30	7	25	30	
25	5	6	4	18	47	30	8	28	34	
26	17	7	5	18	32	30	9	30	38	
27	29	8	6	18	16	31	0	32	42	
28	40	9	7	18	0	31	1	34	46	
29	50	10	8	17	44	31	2	35	50	
30	59	11	9	17	28	31	3	37	54	
31	4	12	10	17	11	31	4	38	5	
					In Leap-Yr take out for a Day sooner in Jan. and Feb. viz. 1 Jan. for 2, &c. v Feb. 28 for 29.					

In Leap-Yr take out for a Day sooner in
Jan. and Feb. viz. 1 Jan. for 2, &c. &
Feb. 28 for 29.

D. Br.	☿ rises	Len. D.	L. Twi.	☿ Am.	D. Br.	☿ rises	Len. D.	L. Twi.	☿ Am.	
D. Twil.	and sets	Day In.	7 Stars	at rising	D. Twil.	and sets	Day In.	7 Stars	at rising	
ends.	appart.		Souths.	& sett.	ends.	appart.		Souths.	& sett.	
1	5 ^h 59 ^m	8 ^h 4 ^m	7 ^h 52 ^m	2 ^h 10 ^m	38° 55'	5 ^h 28 ^m	7 ^h 20 ^m	9 ^h 7 ^m	2 ^h 0 ^m	28°
6	6 1	3 56	8 7	8 A 41	38 49	6 32	4 34	1 23	6 A 28	27 4
6	5 56	8 1	7 59	2 8	37 53	5 20	7 17	9 26	2 0	25 2
	6 4	3 59	8 15	2 19	37 46	6 40	4 43	1 42	6 9	25
11	5 52	7 55	8 9	2 8	36 36	5 12	7 8	9 44	1 58	22 1
	6 8	4 4	0 24	7 58	36 22	6 48	4 52	2 0	5 49	22 1
16	5 48	7 50	8 20	2 6	34 52	5 4	6 59	10 3	1 57	19 4
	6 12	4 10	0 35	7 36	34 45	6 56	5 1	2 19	5 30	19
21	5 43	7 44	8 34	2 4	32 58	4 55	6 49	10 22	1 56	16
	6 17	4 16	0 49	7 15	32 49	7 5	5 11	2 38	5 11	16
26	5 37	7 36	8 49	2 2	30 51	4 46	6 39	10 42	1 56	13
	6 23	4 24	1 4	6 54	30 41	7 14	5 21	2 57	5 52	13

A RADICAL DIARY, (1756) for PERPETUITY.

MARCH xxxi Days.

☉.Cl.	☉ Pla	Declin.	R.A.D.	R.A.T.
12 ^m 41 ^s	11 ^h 24 ^m	7° 18'	342° 51'	22 ^h 31 ^m
12 28	12 24	6 55	343 47	22 55
12 14	13 24	6 32	344 43	22 59
12 1	14 24	6 9	345 38	23 3
11 47	15 24	5 46	346 34	23 6
11 32	16 24	5 23	347 29	23 10
11 17	17 24	4 59	348 25	23 14
11 1	18 24	4 36	349 20	23 17
10 45	19 24	4 12	350 15	23 21
10 29	20 23	3 49	351 11	23 25
10 12	21 23	3 25	352 6	23 28
9 55	22 23	3 2	353 0	23 32
9 38	23 23	3 38	353 55	23 36
9 21	24 22	2 14	354 50	23 40
9 4	25 22	1 51	355 45	23 43
8 46	26 22	1 27	356 40	23 47
8 29	27 21	1 3	357 34	23 50
8 10	28 21	0 40	358 29	23 54
7 52	29 20	0 16	359 24	23 58
7 35	30 20	0 N 8	0 18	0 1
7 15	1 19	0 32	1 13	0 5
6 56	2 19	0 55	2 7	0 9
6 37	3 18	1 19	3 2	0 12
6 18	4 17	1 42	3 56	0 16
5 59	5 17	2 6	4 50	0 19
5 40	6 17	2 30	5 45	0 23
5 21	7 15	2 53	6 39	0 27
5 3	8 14	3 16	7 34	0 30
4 44	9 13	3 40	8 28	0 34
4 26	10 13	4 3	9 23	0 38
4 7	11 12	4 26	10 17	0 41

APRIL xxx Days.

☉.Cl.	☉ Pla	Declin.	R.A.D.	R.A.T.
3 ^m 49 ^s	12 ^h 11 ^m	4° 49'	11° 12'	0 ^h 4 ^m
3 31	13 10	5 12	12 6	0 4
3 13	14 9	5 35	13 1	0 5
2 55	15 8	5 58	13 56	0 5
2 37	16 7	6 21	14 50	1
2 19	17 5	6 44	15 45	1
2 2	18 4	7 6	16 40	1
1 45	19 3	7 28	17 35	1
1 28	20 2	7 51	18 29	1
1 11	21 1	8 13	19 24	1
0 54	22 59	8 35	20 19	1
0 38	23 58	8 57	21 14	1
0 22	24 57	9 18	22 10	1
0 6	25 55	9 40	23 5	1
of aftn	25 54	10 1	24 0	1
0 24	26 52	10 23	24 56	1
0 38	27 51	10 44	25 51	1
0 22	28 49	11 5	26 48	1
1 5	29 48	11 25	27 43	1
1 18	30 46	11 46	28 38	1
1 31	1 45	12 6	29 34	1
1 43	2 43	12 26	30 30	2
1 55	3 41	12 46	31 27	2
2 6	4 40	13 6	32 23	2
2 17	5 38	13 25	33 19	2
2 27	6 36	13 45	34 16	2
2 37	7 34	14 4	35 13	2
2 46	8 33	14 23	36 9	2
2 55	9 31	14 41	37 6	2
3 4	10 29	15 0	38 3	2

D. Br.	☉ rises	Len. D.	L. Twi.	☉ Am.
D. Twil.	ends.	and sets	7 Stars	attifing
ends.	appart.	Day In.	South.	& sett.
1	4 ^h 41 ^m	6 ^h 34 ^m	10 ^h 53	11 ^h 55 ^m
7	20	5 27	3 9	4 44
6	4 30	6 24	11 13	1 56
7	31	5 37	3 29	4 22
11	4 19	6 14	11 33	1 57
7	42	5 47	3 48	4 4
16	4 8	6 4	11 53	1 57
7	53	5 57	4 8	3 46
21	3 57	5 54	12 13	1 58
8	4	6 7	4 28	3 28
26	3 45	5 44	12 32	2 0
8	16	6 27	4 48	8 10

D. Br.	☉ rises	Len. d.	L. Twi.	☉ Ar.
D. Twil.	ends.	and sets	day In.	7 Stars
ends.	appart.	day In.	South.	at tif.
3	3 ^h 31 ^m	5 ^h 32 ^m	12 ^h 56	1 ^h 3 ^m
8	29	6 28	5 11	2 44
3	18	5 23	11 15	2 6
8	43	6 38	5 31	2 30
3	34	5 13	13 35	2 21
8	57	6 48	5 51	2 12
2	51	5 3	23 34	2 24
9	10	6 57	6 10	1 53
2	37	4 54	14 23	2 18
9	24	7 7	6 28	1 35
2	20	4 45	14 31	2 26
9	41	7 16	6 47	1 16

A RADICAL DIARY (1756) for PERPETUITY.

JULY <small>xxxi</small> Days.										AUGUST <small>xxxi</small> Days.									
M.Cl.	Pl.	Declin.	R.A.	D.R.	A.	M.Cl.	Pl.	Declin.	R.A.	D.R.	A.	M.Cl.	Pl.	Declin.	R.A.	D.R.	A.	M.Cl.	Pl.
1 ^h 18 ^m	9° 55'	23° 0' N	100° 46'	6 ^h 43 ^m		5 ^h 45 ^m	9° 55'	17° 55'	131° 56'	8 ^h 4		5 ^h 45 ^m	9° 55'	17° 55'	131° 56'	8 ^h 4		5 ^h 45 ^m	9° 55'
3 29 10	51 23	2 101 48	6 47			5 41 10	27 17 39	132 54	8 5			5 41 10	27 17 39	132 54	8 5			5 41 10	27 17 39
3 39 11	48 22	58 102 50	6 51			5 36 11	24 17 24	133 52	8 5			5 36 11	24 17 24	133 52	8 5			5 36 11	24 17 24
3 50 12	45 22	52 103 52	6 55			5 31 12	21 17 7	134 50	8 5			5 31 12	21 17 7	134 50	8 5			5 31 12	21 17 7
4 0 13	42 22	47 104 53	6 59			5 26 13	19 16 51	135 48	9			5 26 13	19 16 51	135 48	9			5 26 13	19 16 51
4 11 14	39 22	41 105 55	7 3			5 20 14	17 16 35	136 45	9			5 20 14	17 16 35	136 45	9			5 20 14	17 16 35
4 21 15	37 22	34 106 56	7 8			5 13 15	14 16 18	137 42	9 1			5 13 15	14 16 18	137 42	9 1			5 13 15	14 16 18
4 30 16	34 22	27 107 58	7 12			5 6 16	12 16 1	138 40	9 1			5 6 16	12 16 1	138 40	9 1			5 6 16	12 16 1
4 38 17	31 22	20 108 59	7 16			4 58 17	9 15 43	139 37	9 1			4 58 17	9 15 43	139 37	9 1			4 58 17	9 15 43
4 47 18	28 22	12 110 0	7 20			4 49 18	7 15 26	140 34	9 2			4 49 18	7 15 26	140 34	9 2			4 49 18	7 15 26
4 55 19	25 22	4 111 2	7 24			4 39 19	5 15 8	141 31	9 2			4 39 19	5 15 8	141 31	9 2			4 39 19	5 15 8
5 3 20	23 21	56 112 3	7 28			4 29 20	2 14 50	142 27	9 3			4 29 20	2 14 50	142 27	9 3			4 29 20	2 14 50
5 10 21	20 21	47 113 4	7 32			4 18 21	0 14 31	143 24	9 3			4 18 21	0 14 31	143 24	9 3			4 18 21	0 14 31
5 17 22	17 21	38 114 4	7 36			4 7 22	58 14 13	144 20	9 3			4 7 22	58 14 13	144 20	9 3			4 7 22	58 14 13
5 23 23	14 21	29 115 5	7 40			3 56 22	55 13 54	145 16	9 4			3 56 22	55 13 54	145 16	9 4			3 56 22	55 13 54
5 29 24	12 21	19 116 6	7 44			3 44 23	53 13 35	146 13	9 4			3 44 23	53 13 35	146 13	9 4			3 44 23	53 13 35
5 34 25	9 21	9 117 6	7 48			3 32 24	51 13 16	147 9	9 4			3 32 24	51 13 16	147 9	9 4			3 32 24	51 13 16
5 39 26	6 20	58 118 7	7 52			3 19 25	49 12 56	148 4	9 5			3 19 25	49 12 56	148 4	9 5			3 19 25	49 12 56
5 43 27	3 20	47 119 7	7 56			3 6 26	46 12 37	149 0	9 5			3 6 26	46 12 37	149 0	9 5			3 6 26	46 12 37
5 47 28	1 20	36 120 7	8 0			2 52 27	44 12 17	149 56	10 0			2 52 27	44 12 17	149 56	10 0			2 52 27	44 12 17
5 50 28	58 20	24 121 7	8 4			2 37 28	42 11 57	150 51	10 0			2 37 28	42 11 57	150 51	10 0			2 37 28	42 11 57
5 52 29	55 20	12 122 6	8 8			2 22 29	40 11 37	151 47	10 0			2 22 29	40 11 37	151 47	10 0			2 22 29	40 11 37
5 54 0	53 20	0 123 6	8 12			2 7 0	38 11 16	152 42	10 0			2 7 0	38 11 16	152 42	10 0			2 7 0	38 11 16
5 56 1	50 19	47 124 5	8 16			1 51 1	36 10 56	153 37	10 0			1 51 1	36 10 56	153 37	10 0			1 51 1	36 10 56
5 57 2	47 19	34 125 5	8 20			1 35 2	34 10 35	154 32	10 0			1 35 2	34 10 35	154 32	10 0			1 35 2	34 10 35
5 57 3	45 19	21 126 4	8 24			1 19 3	32 10 14	155 27	10 0			1 19 3	32 10 14	155 27	10 0			1 19 3	32 10 14
5 57 4	42 19	7 127 3	8 28			1 2 4	30 9 53	156 22	10 0			1 2 4	30 9 53	156 22	10 0			1 2 4	30 9 53
5 56 5	39 18	54 128 1	8 32			0 44 5	28 9 31	157 17	10 0			0 44 5	28 9 31	157 17	10 0			0 44 5	28 9 31
5 54 6	37 18	39 129 0	8 36			0 26 6	26 9 10	158 12	10 0			0 26 6	26 9 10	158 12	10 0			0 26 6	26 9 10
5 52 7	34 18	25 129 59	8 40			0 8 7	24 8 48	159 6	10 0			0 8 7	24 8 48	159 6	10 0			0 8 7	24 8 48
5 49 8	32 18	10 130 57	8 44			0 0 8	22 8 27	160 1	10 0			0 0 8	22 8 27	160 1	10 0			0 0 8	22 8 27
D. Br.	Sun rif.	Len. d.	L. Twil.	Am.	D. Br.	Sun rif.	Len. d.	L. Twil.	Am.	D. Br.	Sun rif.	Len. d.	L. Twil.	Am.	D. Br.	Sun rif.	Len. d.	L. Twil.	Am.
Twil.	and sets	day Dec.	7 Stars	at rising	Twil.	and sets	day Dec.	7 Stars	at rising	Twil.	and sets	day Dec.	7 Stars	at rising	Twil.	and sets	day Dec.	7 Stars	at rising
ends.	appart.		fouth.	& sett.	ends.	appart.		fouth.	& sett.	ends.	appart.		fouth.	& sett.	ends.	appart.		fouth.	& sett.
Twil.	3 ^h 45 ^m	16 ^h 30	No Nt.	37 Nt.	1 ^h 27 ^m	4 ^h 19 ^m	15 ^h 20	2 ^h 58 ^m	20 ^h	Twil.	3 ^h 45 ^m	16 ^h 30	No Nt.	37 Nt.	1 ^h 27 ^m	4 ^h 19 ^m	15 ^h 20	2 ^h 58 ^m	20 ^h
8 15	0 5	8 ^h 51	37 26		10 31	7 ^h 40	1 14	6 ^h 46	29	8 15	0 5	8 ^h 51	37 26		10 31	7 ^h 40	1 14	6 ^h 46	29
Twil.	3 48	16 23	No Nt.	38 22	1 47	4 27	15 3	2 48	27	Twil.	3 48	16 23	No Nt.	38 22	1 47	4 27	15 3	2 48	27
8 11	0 11	8 3	38 30		10 11	7 32	1 31	6 27	27	8 11	0 11	8 3	38 30		10 11	7 32	1 31	6 27	27
Twil.	3 52	16 15	No Nt.	39 10	2 5	4 36	14 47	2 39	24	Twil.	3 52	16 15	No Nt.	39 10	2 5	4 36	14 47	2 39	24
8 7	0 20	8 10	39 16		9 53	7 23	1 47	6 8	24	8 7	0 20	8 10	39 16		9 53	7 23	1 47	6 8	24
Twil.	3 57	16 4	No Nt.	39 40	2 21	4 44	14 30	2 30	22	Twil.	3 57	16 4	No Nt.	39 40	2 21	4 44	14 30	2 30	22
8 2	0 30	7 49	39 42		9 36	7 14	2 5	5 49	23	8 2	0 30	7 49	39 42		9 36	7 14	2 5	5 49	23
Twil.	4 3	15 52	No Nt.	39 50	2 38	4 54	14 13	2 23	19	Twil.	4 3	15 52	No Nt.	39 50	2 38	4 54	14 13	2 23	19
7 56	0 42	7 29			9 21	7 5	2 21	5 31	19	7 56	0 42	7 29			9 21	7 5	2 21	5 31	19
0 57	4 10	15 39	3 17	39 42	2 53	5 3	12 52	2 17	16	0 57	4 10	15 39	3 17	39 42	2 53	5 3	12 52	2 17	16
1 0	7 49	0 56	7 10	39 37	9 6	6 56	2 43	5 12	16	1 0	7 49	0 56	7 10	39 37	9 6	6 56	2 43	5 12	16

RADICAL DIARY, (1756) for FARMERS.

SEPTEMBER xxx Days.

☉ f.Cl.	☉ s.Pl.	Declin.	R.A.	D.R.A.	☉ f.Cl.	☉ s.Pl.	Declin.	R.A.	D.R.A.
om 29	9 22	18° 5'	160° 56'	10h 44'	10h 34'	8° 41'	3° 27'	187° 58'	12h 14'
0 48	10 19	7 43	161 50	10 47	10 53	9 40	3 50	188 53	12 1
1 7	11 17	7 21	162 44	10 51	11 12	10 39	4 83	189 47	12 1
1 26	12 15	6 59	163 39	10 55	11 30	11 38	4 37	190 42	12 4
1 45	13 14	6 36	164 32	10 58	11 48	12 38	5 0	191 37	12 4
2 5	14 12	6 14	165 27	11 2	12 5	13 37	5 23	192 31	12 5
2 25	15 10	5 51	166 21	11 5	12 21	14 36	5 46	193 26	12 5
2 46	16 9	5 29	167 15	11 9	12 37	15 36	6 9	194 21	12 5
3 6	17 7	5 6	168 9	11 13	12 53	16 35	6 32	195 17	13
3 27	18 6	4 43	169 3	11 16	13 8	17 34	6 55	196 12	13
3 47	19 4	4 20	169 57	11 19	13 23	18 34	7 17	197 7	13
4 8	20 3	3 57	170 51	11 23	13 38	19 34	7 40	198 4	13 11
4 29	21 1	3 34	171 45	11 27	13 52	20 33	8 2	198 59	13 17
4 50	22 0	3 11	172 39	11 31	14 5	21 33	8 25	199 54	13 20
5 11	22 58	2 48	173 33	11 34	14 18	22 32	8 47	200 50	13 27
5 32	23 57	2 24	174 27	11 38	14 30	23 32	9 9	201 46	13 27
5 53	24 56	2 1	175 21	11 41	14 42	24 32	9 31	202 43	13 31
6 14	25 54	1 38	176 15	11 45	14 53	25 31	9 53	203 39	13 35
6 35	26 53	1 14	177 8	11 49	15 3	26 31	10 8	204 36	13 38
6 56	27 52	0 51	178 2	11 52	15 13	27 31	10 36	205 32	13 42
7 16	28 51	0 28	178 56	11 56	15 22	28 31	10 58	206 29	13 46
7 37	29 49	0 4	179 50	11 59	15 30	29 31	11 19	207 26	13 50
7 57	30 48	0 5	180 44	12 3	15 38	om 31	11 40	208 23	13 54
8 17	1 47	0 43	181 38	12 7	15 45	1 30	12 1	209 21	13 57
8 37	2 46	1 6	182 32	12 10	15 51	2 30	12 22	210 18	14 1
8 57	3 45	1 30	183 27	12 14	15 57	3 30	12 42	211 16	14 1
9 17	4 44	1 53	184 21	12 17	16 2	4 30	13 3	212 14	14 1
9 36	5 43	2 17	185 15	12 21	16 6	5 31	13 23	213 12	14 1
9 56	6 42	2 40	186 9	12 25	16 9	6 31	13 43	214 10	14 1
10 15	7 41	3 3	187 4	12 28	16 11	7 31	14 3	215 9	14 1
					16 13	8 31	14 22	216 8	14 1

OCTOBER xxxi Days.

☉ f.Cl.	☉ s.Pl.	Declin.	R.A.	D.R.A.	☉ f.Cl.	☉ s.Pl.	Declin.	R.A.	D.R.A.
10h 34'	8° 41'	3° 27'	187° 58'	12h 14'	10h 34'	8° 41'	3° 27'	187° 58'	12h 14'
10 53	9 40	3 50	188 53	12 1	10 53	9 40	3 50	188 53	12 1
11 12	10 39	4 83	189 47	12 1	11 12	10 39	4 83	189 47	12 1
11 30	11 38	4 37	190 42	12 4	11 30	11 38	4 37	190 42	12 4
11 48	12 38	5 0	191 37	12 4	11 48	12 38	5 0	191 37	12 4
12 5	13 37	5 23	192 31	12 5	12 5	13 37	5 23	192 31	12 5
12 21	14 36	5 46	193 26	12 5	12 21	14 36	5 46	193 26	12 5
12 37	15 36	6 9	194 21	12 5	12 37	15 36	6 9	194 21	12 5
12 53	16 35	6 32	195 17	13	12 53	16 35	6 32	195 17	13
13 8	17 34	6 55	196 12	13	13 8	17 34	6 55	196 12	13
13 23	18 34	7 17	197 7	13	13 23	18 34	7 17	197 7	13
13 38	19 34	7 40	198 4	13 11	13 38	19 34	7 40	198 4	13 11
13 52	20 33	8 2	198 59	13 17	13 52	20 33	8 2	198 59	13 17
14 5	21 33	8 25	199 54	13 20	14 5	21 33	8 25	199 54	13 20
14 18	22 32	8 47	200 50	13 27	14 18	22 32	8 47	200 50	13 27
14 30	23 32	9 9	201 46	13 27	14 30	23 32	9 9	201 46	13 27
14 42	24 32	9 31	202 43	13 31	14 42	24 32	9 31	202 43	13 31
14 53	25 31	9 53	203 39	13 35	14 53	25 31	9 53	203 39	13 35
15 3	26 31	10 8	204 36	13 38	15 3	26 31	10 8	204 36	13 38
15 13	27 31	10 36	205 32	13 42	15 13	27 31	10 36	205 32	13 42
15 22	28 31	10 58	206 29	13 46	15 22	28 31	10 58	206 29	13 46
15 30	29 31	11 19	207 26	13 50	15 30	29 31	11 19	207 26	13 50
15 38	om 31	11 40	208 23	13 54	15 38	om 31	11 40	208 23	13 54
15 45	1 30	12 1	209 21	13 57	15 45	1 30	12 1	209 21	13 57
15 51	2 30	12 22	210 18	14 1	15 51	2 30	12 22	210 18	14 1
15 57	3 30	12 42	211 16	14 1	15 57	3 30	12 42	211 16	14 1
16 2	4 30	13 3	212 14	14 1	16 2	4 30	13 3	212 14	14 1
16 6	5 31	13 23	213 12	14 1	16 6	5 31	13 23	213 12	14 1
16 9	6 31	13 43	214 10	14 1	16 9	6 31	13 43	214 10	14 1
16 11	7 31	14 3	215 9	14 1	16 11	7 31	14 3	215 9	14 1
16 13	8 31	14 22	216 8	14 1	16 13	8 31	14 22	216 8	14 1

D. Br.	Sun rif.	L. day	L. Twi.	☉ Am.
Twil.	and sets	& day's	7 Stars	at rising
ends.	appar.	decr.	fooths.	& sett.
1 3h 0m	3h 14m	13h 30	2h 11m	29N 46
8 50	6 44	3 5	6M 46	29 30
6 3 23	5 24	13 11	2 7	27 27
8 36	6 35	3 24	6 27	27 9
11 3 35	3 34	12 51	2 4	24 58
8 24	6 25	3 41	6 8	24 39
16 3 47	5 44	12 32	2 3	22 21
8 12	6 35	4 3	5 49	22 1
11 3 58	5 53	12 12	2 1	19 36
8 1	6 5	4 23	5 31	19 17
26 4 9	6 3	11 51	2 0	16 46
7 50	5 56	4 44	5 12	16 25

D. Br.	Sun rif.	L. day	L. Twi.	☉ Am.
Twil.	and sets	& day's	7 Stars	at rising
ends.	appar.	decr.	fooths.	& sett.
4h 20	6h 1	11h 53	2h 59	58
7 39	5 46	5 2	3M 3	5 8
4 30	6 23	11 13	1 58	8 8
7 29	5 36	5 22	2 44	8 8
4 40	6 33	10 50	1 57	11
7 19	5 22	5 45	2 26	11
4 50	6 42	10 34	1 57	14
7 9	5 16	6 1	2 8	14
5 0	6 52	10 15	1 57	17
6 59	5 7	6 29	1 49	17
5 9	7 1	9 56	1 58	20
6 50	4 57	6 39	1 30	20